

CATALOGUE OF
COMETARY ORBITS
1960

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CATALOGUE OF
COMETARY ORBITS
EQUINOX 1950.0

FOURTH REPORT OF THE COMPUTING SECTION
COMPILED UNDER THE DIRECTORSHIP OF
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BRITISH ASTRONOMICAL ASSOCIATION
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P R E F A C E

This catalogue of cometary orbits was planned many years ago as an extension of Galle's *Cometenbahnen*, on the lines of Crommelin's catalogues in *Memoirs B.A.A.*, 26, part 2, and 30, part 1. The proposal to publish such a catalogue as another B.A.A. Memoir was approved at the Dublin meeting of the International Astronomical Union in 1955, and a grant was voted to the Association towards the cost of publication. The actual preparation and checking of the catalogue has taken much longer than was intended, and the Computing Section is now under the Directorship of Dr C. Dinwoodie. However, the author has continued to be responsible for the entire production of the catalogue as the Fourth Report of the Computing Section. Acknowledgements are made elsewhere to those who have contributed in any way to the preparation of this work, but the thanks of the Association are also due to the International Astronomical Union for the generous assistance which has made the printing of the catalogue possible.

J. G. Porter

INTRODUCTION

Although the original plan to produce an extension to Galle's *Cometenbahnen* has undergone a number of changes, two essential considerations have remained unaltered; these are (1) to provide a reliable list of cometary orbits, free from all possible sources of error, and (2) to reduce the angular elements of all the orbits to the common equinox of 1950-0, so that comparisons may be made and changes interpreted more readily.

The standard of accuracy set by Galle's *Cometenbahnen* was extremely high, and few errors have been found in this work, yet it suffers from the defect that it does not discriminate between the many orbits given, and it is by no means true that the latest set of elements of any comet is necessarily the best. Crommelin's two extensions of Galle's catalogue, which were published as *Memoirs of the Association*, are not entirely reliable, and contain errors which could have been removed by more careful proof-reading. As an example of the serious errors which have arisen, the case of comet 1870 II may be quoted; in *Memoirs B.A.A.*, 26, part 2, this comet has been given the period and eccentricity of comet 1871 IV, two lines lower down. Errors of this kind, or those caused by faulty conversion of logarithmic quantities are, however, less troublesome than erroneous references, and much time has been spent in tracking down the correct volume or page number (and even, in some cases, the correct publication) in references to some of the older and more obscure journals.

Unfortunately, errors of all types have been copied from one catalogue to another, with the result that none of the later catalogues reaches Galle's standard. No attempt is made here to list these numerous errors; the elements given have in nearly every case been obtained from the original literature, and this catalogue is therefore to be regarded as a new and completely independent publication.

This catalogue gives the most reliable set of elements for each comet for which an orbit has been computed, with the exception of seven which were considered to be too uncertain. These are the comets of the years -466 and -371, and those of 539 and 1351, together with comets Cooper 1880, Giacobini 1928 and Carrasco 1933, which have received no official designation. Comet Perrine 1916 III, although most uncertain, has been included so as to maintain the continuity of the official designations; for the same reason the numbering of comets 1798 II and 1924 IV has been preserved, although both comets have their dates of perihelion passage in the following years when reckoned in U.T. The comets of 868 and 1625 have been added to Crommelin's list (as in Baldet's catalogue) and the data have been extended to include all comets observed up to the end of 1960.

The use of only one orbit for each comet necessarily implies the use of some degree of personal selection. In most cases no difficulty has arisen over the choice of orbit, and only with the less reliable elements has any decision been called for. In general, a parabolic orbit has been given preference over a doubtful ellipse of high eccentricity or (as in at least one case) a hyperbolic orbit based on only three observations.

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An unfortunate feature of some recent catalogues is the misuse of the word "definitive". Originally intended to mean merely that all available material had been used in deriving the elements of the comet, the word seems to have acquired a deeper significance, and is frequently used as a synonym for "superlative". This is misleading, because many definitive orbits (properly so called) are far from being reliable. For this reason the word "definitive" is not used in this catalogue; in its place the following system of classification has been adopted to indicate the methods and the amount of data that have been used in deriving the elements:

- D = Rough elements only, not derived from observations; for example, Halley's Comet, as derived by Cowell and Crommelin from their perturbation schemes, and compared with a few vague observations.
- C = Three observations only—usually a preliminary orbit.
- B = More than three observations. This may refer to three or four normal places, each formed from two or more observations; or an orbit based on three observations, but compared with a number of others; or a predicted orbit corrected by a few observations only.
- A = A large number of observations have been used to form at least five normals, giving differential corrections to a preliminary orbit.
- 0 = No further details available in this reference.
- 1 = Weak or indeterminate solution; or large residuals; or short arc.
- 2 = Periodic orbit, not linked with previous (or subsequent) apparitions.
- 3 = Orbit based on a satisfactorily long arc, but no perturbations applied. This is normally satisfactory for a parabolic orbit, where the conditions (high inclination, distant planets, etc.) have usually been examined.
- 4 = Periodic orbit in which n and a have been adjusted from a knowledge of a previous (or later) T .
- 5 = Detailed discussion in the best style of the time; perturbations have been applied, or at least discussed, and, in the case of a periodic orbit, normals at more than one apparition have been linked completely by a perturbation scheme.

Predicted elements are indicated by the symbol p following the time of perihelion passage T . The correction ΔT days to be applied to the predicted T is then given instead of the normal classification. In some cases the time T and also a , n and P have been corrected by means of one or two observations, and this is indicated by $\Delta T = 0$.

This system of classification is not to be regarded as in any sense a system of weighting. Although in general the orbits in class A are more reliable than others, the standards of different computers have varied widely over the years.

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and it may also be realised that a periodic comet classed as B.4 may well be better determined than some parabolic orbits in class A.5.

The main catalogue (pages 5 to 65) gives the elements of the orbits in five columns. These are:

1. *Reference number.*—This number is used in this catalogue only, and is not a continuation of the numbering in any other list.
2. *Name.*—The name of the comet as used today; thus P/Crommelin is used for all appearances of the comet originally known as Pons-Coggia-Winnecke-Forbes. The symbol P/ is used to denote a short-period comet, i.e., one whose period is less than 200 years.
3. *Official designation, T and classification.*—The Roman numeral designation, giving the comets in chronological order of their dates of perihelion passage, is the official designation. The preliminary numbering, using the year of discovery followed by a small letter, is also given, but is subject to some uncertainty. In the early years, and also during and after the two world wars, communication was difficult and there is still considerable confusion in the literature over these preliminary designations.

The time of perihelion passage T is given in U.T. (day begins at midnight) in decimals of a day. Dates before 1583 are in Old Style. In some recent comets, the time is given in Ephemeris Time, and this is indicated by the symbol E . Details of the system of classification are given above.

4. *Angular elements ω , Ω and i .*—These are given to four decimals of a degree (unless unreliable) and are referred to the ecliptic and equinox of 1950.0; all the reductions for precession have been checked by comparison of two independent calculations. In some of the earlier comets the equinox to which the elements are referred is not stated; in such cases a suitable equinox has been assumed, as stated in the Table of Notes and References.
5. *Size and shape of orbit.*—The last column gives, in order, the perihelion distance q and eccentricity e , both to six decimal places, and the period P for short period comets, or the value of $1/a$ for near-parabolic orbits. The period is simply the value of $a^{3/2}$, i.e., it is given in Gaussian years of 365.2569 days, normally to six decimal places. The value of $1/a$ is given to seven decimal places, with the appropriate sign.

The nature of each orbit is clearly indicated as follows:

Short-period orbits: e is less than 1, and P is quoted.

Long-period (elliptical) orbits: e is less than 1, and a positive value of $1/a$ is given.

Parabolic orbits: $e = 1.0$ and the third line is left blank.

Hyperbolic orbits: e is greater than 1 and $1/a$ is negative.

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Orbits in which the computer has made an assumption as to the period or mean motion are indicated by enclosing this value in brackets.

Conversion to other quantities may be performed (within the limits imposed by the number of figures given here) as required; thus the mean daily motion n° and the semi-major axis a are given by

$$n^\circ = 0.9856077/P,$$

$$a = P^{\frac{2}{3}} = q/(1 - e).$$

Statistics. Omitting Comet Flaugergues 1826 III, there are 829 sets of elements which refer to 566 individual comets, namely

317 apparitions of 54 short-period comets

40 short-period comets, one appearance only

~~117~~ 116 long-period comets (ellipses)

~~290~~ 291 parabolic orbits

65 hyperbolic orbits

Some further particulars of these groups may be obtained from the four subsidiary tables at the end of this *Memoir*, as follows:

Appendix A, periodic comets observed at more than one apparition;
approximate elements at each return;

Appendix B, periodic comets of one appearance only;

Appendix C, hyperbolic orbits;

Appendix D, approximate elements of all comets in order of i .

The main catalogue is followed by a list of references and some explanatory notes. Original references have been consulted in all possible cases, and for only a few of the comets has it been necessary to quote data from previous catalogues by Olbers, Carl or Galle. The original literature has been consulted mainly in the libraries of the Royal Greenwich Observatory, the Royal Astronomical Society and the Crawford Library of the University of Edinburgh. Acknowledgments are made to the Astronomer Royal, the Council of the Royal Astronomical Society and the Astronomer Royal for Scotland for the use of these facilities.

Every care has been taken in reading the proofs of this work, comparison having been made with the original MS., and with the card catalogue on which the original data were copied; each Appendix has also been checked in the same way, as well as by comparison with the main catalogue. The author's warmest thanks are due to B. G. Marsden and M. P. Candy, who have not only assisted in this arduous work, but have also played a large part in the search for original material. Their assistance at all times in these and many other ways has been of the utmost value. Several members of the Computing Section of the Association, working under the guidance of W. H. Julian, have been responsible for the conversion of the angular elements to the equinox of 1950.0. Many hands have made light work of this onerous task, and their efforts are greatly appreciated. A final word of praise is due to the printer and his staff, who have taken a personal interest in making this catalogue a worthy publication, as free as possible from all kinds of error.

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
1	P/Halley	-239 May 15 D.1	109.8 58.2 162.2	0.60 0.967 76.9
2	P/Halley	-162 May 20 D.1	109.8 57.1 162.1	0.60 0.967 76.6
3	Roman Comet	-136 Apr. 29 C.1	350 221 160	1.010 1.0
4	P/Halley	-86 Aug. 15 D.1	109.7 57.0 162.1	0.60 0.967 76.8
5	Chinese Comet	-68 July - C.1	~~315~~ 12.5 166 70	0.79 1.0
6	P/Halley	-11 Oct. 9.3 D.1	108.7 55.9 162.1	0.594 0.967 76.3
7	P/Halley	+66 Jan. 26 D.1	108.7 55.8 162.1	0.594 0.967 76.5
8	P/Halley	141 Mar. 25 D.1	108.7 54.8 163.1	0.599 0.967 77.4
9	P/Halley	218 Apr. 6 D.1	108.6 54.7 163.1	0.599 0.967 77.4
10	Chinese Comet	240 Nov. 10 C.1	82 213 44	0.371 1.0
11	P/Halley	295 Apr. 7 D.1	108.6 54.6 163.1	0.610 0.967 79.4
12	P/Halley	374 Feb. 13 D.1	108.6 54.5 163.1	0.606 0.967 78.7
13	P/Halley	451 July 4.0 D.1	109.1 53.9 164.1	0.610 0.967 79.5
14	P/Halley	530 Nov. 15 D.1	108.5 53.3 163.1	0.606 0.967 78.7

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
15	Chinese Comet	565 July 15-0 D.1	$79^{\circ}5$ 178.8 120.8	0.832 1.0
16	Chinese Comet	568 Aug. 29.82 C.1	22.62 315.18 4.26	0.90739 1.0
17	Chinese Comet	574 Apr. 7.78 C.1	15.49 147.34 46.36	0.9629 1.0
18	P/Halley	607 Mar. 20 D.1	108.5 53.2 163.1	0.600 0.967 77.4
19	P/Halley	684 Nov. 6 D.1	108.5 53.1 163.1	0.600 0.967 77.6
20	P/Halley	760 June 11 D.1	107.9 53.5 163.1	0.597 0.967 76.9
21	Chinese Comet	770 June 7.14 C.1	86.94 105.43 120.43	0.6027 1.0
22	P/Halley	837 Feb. 25 D.1	108.4 52.9 163.1	0.596 0.967 76.8
23	Bright Comet	868 Mar. 4 C.0	277 320 65	0.622 1.0
24	P/Halley	912 July 19 D.1	109.4 53.8 163.1	0.601 0.967 77.7
25	Chinese Comet	961 Dec. 30.66 C.1	81.73 9.44 95.56	0.53689 1.0
26	P/Halley	989 Sept. 2.5 D.1	111.0 58.0 163.1	0.584 0.967 77.16
27	Bright Comet	1006 Mar. 22 D.1	93.94 51.5 162.6	0.58350 1.0
28	P/Halley	1066 Mar. 27 D.1	105.6 51.2 163.6	0.610 0.967 79.40

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)	
29	Chinese Comet	1092 Feb. 15-5 C.1	$30^{\circ}81$ 137-50 28-83	0-9281 1-0	
30	Bright Comet	1097 Sept. 22-4 C.1	124-92 219-40 73-42	0-7385 1-0	
31	Bright Comet	1132 Aug. 30-70 C.1	114-2 212-5 106-3	0-7355 1-0	
32	P/Halley	1145 Apr. 19 D.1	105-7 51-4 163-6	0-608 0-967 79-0	
33	P/Halley	1222 Sept. 10 D.1	105-8 52-4 163-6	0-608 0-967 79-2	
34	Chinese Comet	1231 Jan. 30-80 B.1	121-70 23-12 6-17	0-9478 1-0	
35	Bright Comet	1240 Jan. 21-56 C.1	331-4 134-4 75-3	0-6677 1-0	
36	Brilliant Comet	1264 July 20-30 B.1	159-70 150-35 16-40	0-8249 1-0	
37	Bright Comet	1299 Mar. 31-812 C.1	103-88 116-24 111-01	0-31793 1-0	
38	P/Halley	1301 Oct. 23-2 D.1	107 53 163	0-608 0-967 79-1	
39	Brilliant Comet	1337 June 15-57 C.1	90-80 101-66 139-51	0-82823 1-0	
40	Bright Comet	1362 Mar. 2-83 C.1	10 245 148	0-4700 1-0	
④ 41	P/Tempel- Tuttle?	1366 Oct. 18-54 B.0	166-68 226-54 149-75	0-9749 0-9059 [33-35]	) JBE C O '65 P4
42	P/Halley	1378 Nov. 9-27 D.1	108-0 55-5 162-1	0-601 0-967 77-8	

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
43	Chinese Comet	1385 Oct. 16-75 C.1	$166^{\circ}64$ 276-34 127-76	0-77375 1-0
44	Brilliant Comet	1402 [Mar. 21] D.1	91 125 55	0-38 1-0
45	Bright Comet	1433 Nov. 8-2701 C.1	189-386 103-554 103-981	0-49277 1-0
46	Bright Comet	1449 Dec. 9-8682 B.1	356-708 268-126 155-678	0-32742 1-0
47	P/Halley	1456 June 8-70226 A.1	104-997 50-819 162-413	0-58027 0-967825 76-614
48	P/Crommelin	1457 I Jan. 24-97 B.1	204-153 242-078 23-724	0-7276 0-921 [28]
49	Toscanelli	1457 II Aug. 8-5006 B.1	185-032 191-373 9-800	0-76043 1-0
50	Bright Comet	1468 Oct. 7-927 B.1	69-82 77-87 141-99	0-82972 1-0
51	Regiomontanus	1472 Mar. 1-43906 B.1	245-764 292-210 170-863	0-48589 1-0
52	Bright Comet	1490 Dec. 24-97 C.1	129-85 295-19 51-65	0-7376 1-0
53	Chinese Comet	1499 Sept. 6-68 C.0	33-44 332-85 21-05	0-954 1-0
54	Bright Comet	1500 May 17 C.0	20 316 105	1-40 1-0
55	Bright Comet	1506 Sept. 4 162 C.1	242-27 139-06 134-94	0-38598 1-0
56	P/Halley	1531 Aug. 26-292 B.1	104-5 51-5 163-0	0-57994 0-967391 [75]

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
57	Fracastore	1532 Oct. 19-832 C.0	24-52 93-12 32-59	0-51922 1-0
58	Apian	1533 June 15-383 C.1	278-26 305-21 28-27	0-32686 1-0
59	Fabricius	1556 Apr. 22-6846 A.1	100-868 180-736 32-377	0-49082 1-0
60	Hesse- Gemma	1558 Sept. 14-04 B.1	119-60 340-51 110-93	0-2805 1-0
61	Brahe	1577 Oct. 27-4476 C.1	255-669 30-537 104-878	0-1775 1-0
62	Moestlin	1580 Nov. 28-9931 C.1	89-363 24-251 64-606	0-60237 1-0
63	Brahe	1582 May 6-9132 C.1	331-901 232-338 118-543	0-16872 1-0
64	Hesse- Rothmann	1585 <i>New Style</i> Oct. 8-5262 B.3	331-7328 42-4903 6-1301	1-094846 1-0
65	Brahe	1590 Feb. 8-5271 B.1	307-6699 170-6423 150-4574	0-567726 1-0
66	Ripensis	1593 July 19-069 C.1	12-07 169-22 87-92	0-089112 1-0
67	Brahe- Moestlin	1596 July 25-7143 C.1	59-417 335-266 128-074	0-567156 1-0
68	P/Halley	1607 Oct. 27-21595 B.4	107-1672 53-5694 162-8189	0-587974 0-967089 75-5127
69	Kepler	1618 I Aug. 17-627 B.1	24-817 298-128 21-490	0-512980 1-0
70	Brilliant Comet	1618 II Nov. 8-8507 B.1	287-4246 80-2995 37-1956	0-389544 1-0

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
71	P/Crommelin	1625 Jan. 30/31 B.1	196 ^o ·36 252·47 28·98	0·7391 0·9183 27·208
72	Hevelius	1652 Nov. 13·153 C.0	300·1837 92·3037 79·4618	0·84750 1·0
73	Hevelius	1661 Jan. 27·3810 B.3	33·4384 85·8744 33·0147	0·442722 1·0
74	Hevelius	1664 Dec. 4·9834 A.5	310·6569 85·3372 158·6966	1·025531 1·0
75	Hevelius	1665 Apr. 24·719 C.0	156·0928 232·0025 103·8963	0·10649 1·0
76	Gottignies	1668 Feb. 28·0795 B.1	109·811 2·515 144·375	0·066604 1·0
77	Hevelius	1672 Mar. 1·94670 B.1	109·5296 301·9912 82·9677	0·695458 1·0
78	Hevelius	1677 May 6·526 C.0	99·1682 240·6226 100·9310	0·28059 1·0
79	P/ ~~de Vico~~ - ~~LA HIRE~~ Swift	1678 Aug. 18·8148 B.1	159·560 167·020 2·832	1·145297 0·626970 5·37974
80	Kirch	1680 Dec. 18·48760 A.5	350·6203 275·9317 60·6779	0·006222 0·999985 +0·0023437
81	P/Halley	1682 Sept. 15·29506 A.5	109·3609 55·0131 162·2717	0·582894 0·967920 77·45278
82	Flamsteed	1683 July 13·59068 A.3	87·8099 177·1368 96·7443	0·559584 1·0
83	Bianchini	1684 June 8·763 B.1	330·3067 271·8963 65·4230	0·95827 1·0
84	Bright Comet	1686 Sept. 16·3249 B.1	81·913 357·745 34·963	0·33602 1·0

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
85	Richaud	1689 Nov. 30-6589 B.1	$^{\circ}$ 78-1412 283-0524 63-2022	0-064430 1-0
86	Jacob	1695 Oct. 23-768 B.1	59-124 285-306 93-587	0-042297 1-0
87	La Hire- Cassini	1698 Oct. 17-5149 C.1	151-350 69-550 169-092	0-72865 1-0
88	de Fontenay	1699 I Jan. 13-8998 C.1	109-528 325-189 109-419	0-74862 1-0
89	Pallu	1701 Oct. 17-91 C.1	164-961 302-115 138-370	0-59263 1-0
90	La Hire- Maraldi- Bianchini	1702 Mar. 14-107 B.1	309-6625 192-5741 4-3812	0-646830 1-0
91	Cassini- Maraldi	1706 Jan. 30-706 B.1	59-4315 16-5866 55-2644	0-426865 1-0
92	Manfredi- Stancari	1707 Dec. 12-4885 B.1	27-1556 56-2179 88-6430	0-85904 1-0
93	Kirch	1718 Jan. 15-4057 B.1	6-3002 131-1972 148-8430	1-025435 1-0
94	Sanderson	1723 Sept. 28-12789 A.0	331-3764 17-4015 130-0224	0-998790 1-0
95	Sarabat	1729 June 16-6477 C.3	10-4077 313-6936 77-0900	4-05054 1-0
96	Bradley	1737 I Jan. 30-84722 B.1	99-478 229-408 18-330	0-222823 1-0
97	Kegler	1737 II June 2-7304 C.0	129-888 135-046 61-839	0-83474 1-0
98	Zanotti	1739 June 17-91643 C.0	104-7568 210-3475 124-2653	0-673578 1-0

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
99	P/Grigg-Mellish	1742 Feb. 8·1533 A.2	327·0940 188·2896 112·6920	0·762383 0·974587 164·3145
100	P/Grischow	1743 I Jan. 8·69404 C.2	7·2362 88·9798 1·8929	0·861561 0·721309 5·4355
101	Klinkenberg-Struyck	1743 II Sept. 21·1469 B.1	119·0448 8·9326 134·4082	0·522993 1·0
102	Klinkenberg	1744 Mar. 1·83979 A.3	151·4783 48·6028 47·1378	0·222208 1·0
103	Kindermann	1746 Jan. 30·302 C.0	136·985 342·946 9·876	0·8714 1·0
104	Chéseaux	1747 Mar. 3·79907 C.0	230·2919 150·1492 100·8703	2·19851 1·0
105	Maraldi	1748 I Apr. 29·28066 B.1	17·4493 235·6813 94·5140	0·84040 1·0
106	Klinkenberg	1748 II June 19·38752 C.1	245·6637 35·9461 67·0778	0·625357 1·0
107	Bradley-Klinkenberg	1757 Oct. 21·82619 B.5	268·7099 216·9589 12·8329	0·337376 1·0
108	de la Nux	1758 June 11·63726 B.1	36·78 233·51 68·30	0·215352 1·0
109	P/Halley	1759 I Mar. 13·05178 A.4	110·7390 56·5732 162·3974	0·584519 0·967684 76·9271
110	Messier	1759 II Nov. 27·5018 B.1	273·9242 142·3106 79·0896	0·801390 1·0
111	Parisian Comet	1759 III Dec. 17·34108 B.0	301·5076 82·7779 175·1258	0·965760 1·0
112	Klinkenberg	1762 May 28·8345 C.0	115·4803 351·1754 85·6615	1·009048 1·0

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
113	Messier	1763 Nov. 2-37381 B.1	$^{\circ}$ 88-5702 359-0454 72-4910	0-498185 1-0
114	Messier	1764 Feb. 13-07101 B.1	104-8522 122-6864 127-0931	0-555216 1-0
115	Messier	1766 I Feb. 17-86156 B.1	100-8886 246-7222 139-1536	0-505324 1-0
116	P/Helfenzrieder	1766 II Apr. 27-77814 B.2	178-1333 76-1270 7-9274	0-402654 0-852396 4-5056
117	Messier	1769 Oct. 8-12040 B.1	329-1231 177-5940 40-7403	0-122755 0-999249 +0-0061178
118	P/Lexell	1770 I Aug. 14-04086 A.2	224-8586 133-9261 1-5565	0-674449 0-786119 5-599707
119	de la Nux	1770 II Nov. 22-73518 B.1	260-3641 111-2354 148-5577	0-528242 1-0
120	Messier	1771 Apr. 19-63495 B.0	76-2057 30-3166 11-2838	0-901835 1-0
121	P/Biela	1772 Feb. 17-15531 B.4	212-9699 259-8208 17-0501	0-986031 0-724509 [6-77135]
122	Messier	1773 Sept. 6-10681 B.1	314-1116 123-5383 61-2236	1-126886 1-0
123	Montaigne	1774 Aug. 16-3301 C.1	136-7150 183-1858 83-3179	1-432869 1-028295 -0-0197471
124	Bode- Messier	1779 Jan. 4-57930 A.5	62-1640 27-4462 32-4290	0-713180 0-999844 +0-0002180
125	Messier	1780 I Oct. 1-42631 A.0	237-1091 126-0618 125-5987	0-096303 0-999946 +0-0005607
126	Montaigne- Olbers	1780 II Nov. 29-34490 C.1	255-162 144-393 107-923	0-515277 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
127	Méchain	1781 I July 7-68888 B.1	156-2020 85-3592 81-7237	0-77586 1-0
128	Méchain	1781 II Nov. 30-02321 C.1	61-3779 79-7695 152-8008	0-960995 1-0
129	P/Pigott	1783 Nov. 20-43036 B.2	354-6428 57-9866 45-1248	1-459289 0-552456 5-88787
130	de la Nux	1784 Jan. 21-6996 B.1	336-1076 59-1553 128-8561	0-707858 1-0
131	Messier- Méchain	1785 I Jan. 27-82550 C.3	205-6384 266-5150 70-2373	1-143398 1-0
132	Méchain	1785 II Apr. 8-91400 A.3	127-1968 66-9886 92-6367	0-427240 0-996461 +0-0082840
133	P/Encke	1786 I Jan. 31-3735 B.1	182-4712 336-4504 13-6204	0-33483 0-84836 3-2810
134	C. Herschel	1786 II July 8-38138 A.5	324-9561 196-7488 50-8984	0-410088 0-999077 +0-0022495
135	~~Méchain~~ ~~MESSIER~~ ^{STET.}	1787 May 11-32545 C.1	99-1499 109-1522 131-7270	0-348911 1-0
136	~~Méchain~~ ~~MESSIER~~	1788 I Nov. 10-80933 B.0	57-8362 159-1669 167-5186	1-063012 1-0
137	P/C. Herschel- Rigollet	1788 II Nov. 20-83133 A.2	30-4390 354-7318 64-4887	0-757427 1-0
138	C. Herschel	1790 I Jan. 17-29039 C.1	114-4212 175-0672 150-2438	0-747336 1-0
139	P/Tuttle	1790 II Jan. 31-37022 A.5	207-0649 270-8578 54-1094	1-044379 0-819330 13-898195
140	C. Herschel	1790 III May 21-7409 C.3	119-4749 35-4239 116-1417	0-797961 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
141	C. Herschel	1792 I Jan. 14-0659 C.0	$^{\circ}$ 154-2657 192-9685 140-1984	1-293024 1-0
142	Gregory- Méchain	1792 II Dec. 27-7536 C.1	147-2393 285-4294 130-9781	0-966287 1-0
143	Messier	1793 I Nov. 5-3414 C.1	239-8031 110-6783 119-6444	0-40344 1-0
144	Perny	1793 II Nov. 20-82756 A.3	69-9737 4-1815 51-5282	1-494171 0-971995 +0-0187431
145	P/Encke	1795 Dec. 21-94100 B.1	182-0065 336-8328 13-7275	0-334429 0-848883 3-292200
146	Olbers	1796 Apr. 3-27367 B.1	184-2940 19-1978 115-1657	1-579636 1-0
147	Bouvard- C. Herschel- Lee	1797 July 9-60498 B.0	279-7978 331-3894 129-3423	0-526610 1-0
148	Messier	1798 I Apr. 5-00833 B.1	342-9947 124-2285 43-7876	0-485030 1-0
149	Bouvard- Olbers	1798 II Dec. 32-0409 C.1	214-9870 251-5988 137-6052	0-779681 1-0
150	Méchain	1799 I Sept. 7-69094 A.0	95-8202 101-6228 129-0634	0-839863 1-0
151	Méchain	1799 II Dec. 26-3964 C.1	136-4743 328-9115 102-9904	0-625802 1-0
152	Reissig- Pons- Messier	1801 Aug. 9-0565 B.1	219-8259 44-6008 159-2626	0-256413 1-0
153	Pons- Méchain- Olbers	1802 Sept. 10-35543 A.3	21-8530 312-3128 57-0060	1-094249 1-0
154	Pons- Bouvard- Olbers	1804 Feb. 14-0881 B.1	331-9464 178-8383 56-4587	1-071168 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
155	P/Encke	1805 Nov. 21-9999 B.1	182° 4285 336-3710 13-5762	0-340421 0-846175 3-29220
156	P/Biela	1806 I Jan. 2-4187 B.2	218-1223 253-3594 13-6014	0-907089 0-745539 6-73044
157	Pons	1806 II Dec. 29-42294 B.3	225-3145 324-3703 144-9736	1-081903 1-0
158	Giovanni PARISI	1807 Sept. 19-23888 A.5	4-1043 268-7819 63-1758	0-646124 0-995488 +0-0069835
159	Pons- Wisniewsky	1808 I May 13-453 B.1	253-7479 324-9463 134-2975	0-38986 1-0
160	Pons	1808 II July 12-6677 C.1	131-5554 26-1813 140-6995	0-607953 1-0
161	Pons	1810 Oct. 6-73793 B.3	114-9225 310-8026 62-9407	0-969623 1-0
162	Flaugergues	1811 I Sept. 12-75628 A.5	65-4061 142-3502 106-9397	1-035412 0-995124 +0-0047092
163	Pons	1811 II Nov. 11-54267 A.5	314-4898 94-9426 31-2565	1-581701 0-980916 +0-0120655
164	P/Pons- Brooks	1812 Sept. 15-82561 A.2	199-2994 254-9436 73-9569	0-777124 0-955584 73-1862
165	Pons	1813 I Mar. 5-02197 A.3	170-5796 242-4627 158-8511	0-699314 1-0
166	Pons- Harding	1813 II May 19-91745 B.3	204-9660 44-5854 98-9750	1-215965 1-0
167	P/Olbers	1815 Apr. 26-4999 A.5	65-5817 85-3435 44-4978	1-212997 0-931732 74-8976
168	Pons	1816 Mar. 1-8456 B.0	304-3309 325-1287 43-1058	0-048503 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
169	P/Crommelin	1818 I Feb. 6.55 B.4	195-6971 251-3641 29-1285	0.746865 0.918470 27.7260
170	Pons	1818 II Feb. 26.46901 A.5	112-3556 72-2965 89-7504	1.197821 1.0
171	Pons	1818 III Dec. 5.4347 B.1	348-1000 91-8494 116-9066	0.855096 1.0
172	P/Encke	1819 I Jan. 27.75309 A.5	182-4185 336-4058 13-6318	0.335183 0.848619 3.294699
173	Tralles	1819 II June 28.21814 A.5	13-4223 275-5353 80-7504	0.341514 1.0
174	P/Pons- Winnecke	1819 III July 19.40021 A.2	161-5809 114-9231 10-7046	0.773639 0.755190 5.617776
175	P/Blanpain	1819 IV Nov. 20.84741 B.2	350-220 79-154 9-107	0.892319 0.698752 5.097933
176	Nicollet- Pons	1821 Mar. 22.03656 B.3	169-2065 50-4870 106-4576	0.091823 1.0
177	Gambart- Pons- Biela	1822 I May 6.1060 B.1	344-7164 179-2347 126-3600	0.504413 1.0
178	P/Encke	1822 II May 24.46346 A.5	182-7632 336-2228 13-3550	0.345876 0.844506 3.317503
179	Pons	1822 III July 16.3337 B.1	237-765 99-534 143-693	0.84713 1.0
180	Pons- Gambart- Bouvard	1822 IV Oct. 24.26624 A.0	181-0980 94-5391 127-3438	1.145098 0.996302 +0.0032293
181	de Breaute- Pons	1823 Dec. 9.93398 A.3	28-4919 304-8081 103-8152	0.226742 1.0
182	Rumker	1824 I July 12.01883 A.1	334-0870 236-1008 125-4356	0.591671 1.0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
183	Scheithauer etc.	1824 II Sept. 29-56645 B.3	$85^{\circ}2368$ 281-0386 54-5967	1-049835 1-0
184	Gambart	1825 I May 31-06869 A.5 (<i>See note</i>)	107-2458 21-8988 123-2876	0-889403 1-000673 -0-0007564
185	Pons- Harding	1825 II Aug. 19-21106 C.1	177-2987 194-6809 89-6810	0-883471 1-0
186	P/Encke	1825 III Sept. 16-77540 A.5	182-7709 336-2151 13-3732	0-344762 0-844930 3-315015
187	Pons- Biela- Dunlop	1825 IV Dec. 11-18485 A.5	256-9254 217-4510 146-4401	1-240846 0-995428 +0-0036842
188	P/Biela	1826 I Mar. 18-94662 B.2	218-2901 253-2521 13-5618	0-902419 0-746601 [6-720561]
189	Pons	1826 II Apr. 22-40871 A.5	279-3900 199-1806 39-9855	2-007282 1-0
190	Flaugergues	1826 III <i>See note</i>		
191	Pons- Gambart	1826 IV Oct. 9-47606 A.5	13-7985 45-7143 25-9455	0-852878 0-997494 +0-0029384
192	Pons- Clausen- Gambart	1826 V Nov. 18-90741 A.3	279-5892 236-8521 90-6265	0-026904 1-0
193	Pons	1827 I Feb. 5-41101 A.3	151-0353 186-2942 102-3962	0-506166 1-0
194	P/Pons- Gambart	1827 II June 7-69242 A.2	19-3021 319-3682 136-4495	0-806694 0-949492 63-8305
195	Pons	1827 III Sept. 12-1670 B.3	258-701 151-400 125-885	0-137759 1-0
196	P/Encke	1829 Jan. 10-24332 A.5	182-7938 336-2022 13-3590	0-345450 0-844666 3-316476

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
197	d'Abbadie	1830 I Apr. 9-79509 A.5	5° -8060 208-0565 21-2625	0-921424 1-0
198	Herapath	1830 II Dec. 28-1604 A.3	26-8909 339-5424 135-2567	0-125887 1-0
199	P/Encke	1832 I May 4-48580 A.5	182-8028 336-1991 13-3847	0-343382 0-845453 3-311892
200	Gambart- Harding	1832 II Sept. 26-07354 A.5	204-6248 74-1216 136-6715	1-183005 1-0
201	P/Biela	1832 III Nov. 26-61688 B.4	221-6872 249-9512 13-2214	0-879086 0-751448 [6-651526]
202	Dunlop	1833 Sept. 10-89549 B.1	260-8256 325-1636 7-3180	0-464340 1-0
203	Gambart- Dunlop	1834 Apr. 3-29258 A.1	50-0381 228-2890 5-9798	0-513106 1-0
204	v. Boguslawski	1835 I Mar. 27-70517 A.3	210-5256 60-0326 170-8819	2-040153 1-0
205	P/Encke	1835 II Aug. 26-86182 A.5	182-7972 336-1997 13-3695	0-344345 0-845075 3-313677
206	P/Halley	1835 III Nov. 16-43887 A.5	110-6842 56-8009 162-2556	0-586569 0-967392 76-2957
207	P/Encke	1838 Dec. 19-50967 A.5	182-8291 336-1812 13-3727	0-343948 0-845218 3-312522
208	Galle	1840 I Jan. 4-97167 A.3	72-2530 121-4875 53-0840	0-618432 0-999913 +0-0001410
209	Galle	1840 II Mar. 13-57563 A.3	156-5845 238-3628 120-7772	1-220789 0-994977 +0-0041146
210	Galle	1840 III Apr. 2-93782 B.3	138-0454 187-5727 79-8576	0-748504 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
211	Bremiker	1840 IV Nov. 14-16411 A.5	133-5839 250-4604 57-9649	1-481104 0-971115 +0-0195023
212	P/Encke	1842 I Apr. 12-51935 A.5	182-8279 336-1758 13-3551	0-344920 0-844831 3-314140
213	Laugier	1842 II Dec. 16-45680 A.3	240-5301 209-3177 106-4208	0-504391 1-0
214	Brilliant Comet	1843 I Feb. 27-91099 A.3	82-6374 2-8274 144-3484	0-005527 0-999914 +0-015617
215	Mauvais	1843 II May 6-55593 A.3	124-2516 158-7322 52-7327	1-616335 1-000180 -0-0001112
216	P/Faye	1843 III Oct. 17-63023 A.5	200-0238 211-0133 11-3644	1-692231 0-555830 7-436447
217	P/de Vico- Swift	1844 I Sept. 2-97789 A.3	278-9416 65-0420 2-9172	1-186317 0-617372 5-459286
218	Mauvais- d'Arrest	1844 II Oct. 17-84287 A.5	211-2609 33-1243 131-4115	0-855388 0-999598 +0-0004704
219	Brilliant Comet (Wilmot)	1844 III Dec. 14-17477 A.5	177-7313 119-7775 45-6384	0-251717 1-000353 -0-0014025
220	d'Arrest	1845 I Jan. 8-66135 A.5	114-5863 338-2100 46-8634	0-905210 1-000247 -0-0002725
221	de Vico- Faye	1845 II Apr. 21-54041 A.3	205-4524 348-5821 56-3973	1-254549 1-0
222	Colla	1845 III June 6-18322 A.3	75-8000 339-2759 131-0922	0-401077 1-0
223	P/Encke	1845 IV Aug. 10-10101 A.5	183-4023 335-8031 13-1404	0-338062 0-847472 3-299663
224	de Vico	1846 I Jan. 22-66009 A.0	338-0224 112-5347 47-4621	1-482192 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
225	P/Biela	1846 II Feb. 11-49317 B.4	223-0841 247-4143 12-5773	0-856446 0-756662 6-602922
226	P/Brorsen	1846 III Feb. 25-869 B.4	13-8016 104-1252 30-9168	0-650128 0-793069 5-568781
227	P/de Vico	1846 IV Mar. 6-04588 B.2	12-9043 79-0051 85-1089	0-663798 0-962910 75-7132
228	de Vico- Hind	1846 V May 28-39585 A.3	78-7501 162-7648 122-3835	1-375992 1-0
229	P/Peters	1846 VI June 1-63446 B.2	339-6024 261-8727 30-6689	1-52928 0-728604 13-3759
230	Brorsen- Wichmann- de Vico	1846 VII June 5-97098 A.3	99-7386 263-3020 150-6810	0-633760 0-990414 +0-015126
231	de Vico	1846 VIII Oct. 30-27722 B.0	93-9746 6-1395 49-7132	0-830669 1-0
232	Hind	1847 I Mar. 30-78436 A.5	254-3523 23-1282 48-6579	0-042593 0-999910 +0-0021236
233	Colla	1847 II June 5-19254 A.5	32-3425 175-3899 100-4229	2-115190 1-0
234	Mauvais- Bond	1847 III Aug. 9-83785 A.5	91-5260 339-7060 96-5754	1-766059 0-998588 +0-0007996
235	Schweizer	1847 IV Aug. 9-84509 A.3	55-4597 78-1749 147-3544	1-484824 1-0
236	P/Brorsen- Metcalf	1847 V Sept. 10-06560 A.5	129-4154 311-2125 19-1296	0-487625 0-970749 68-06406
237	Mitchell- de Vico	1847 VI Nov. 14-89988 A.5	276-6112 192-2686 108-1387	0-329024 1-000173 -0-0005249
238	Petersen	1848 I Sept. 8-54528 A.1	260-9518 212-9517 95-5989	0-319947 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
239	P/Encke	1848 II Nov. 26-58146 A.5	183-4063 335-7998 13-1573	0-336957 0-847865 3-296243
240	Petersen	1849 I Jan. 19-84781 A.3	208-0139 216-6256 85-0385	0-959731 1-0
241	Goujon	1849 II May 26-99257 A.3	33-1643 203-9587 67-1538	1-159396 1-000708 -0-0006106
242	Schweizer- Bond	1849 III June 8-70365 B.0	236-5776 31-9399 66-9326	0-894386 0-997831 +0-0024251
243	Petersen	1850 I July 24-02796 A.5	180-5408 94-2819 68-1877	1-081449 0-998852 +0-0010616
244	Bond- Brorsen	1850 II Oct. 19-83741 A.3	243-2097 207-4041 40-0693	0-565583 1-0
245	P/Faye	1851 I Apr. 2-43667 A.5	200-1449 210-9363 11-3502	1-699878 0-554895 7-463323
246	P/d'Arrest	1851 II July 9-17396 A.5	174-5395 149-7622 13-9081	1-173308 0-659282 6-390369
247	Brorsen	1851 III Aug. 26-74581 A.3	87-2684 225-0673 38-2077	0-984753 1-0
248	Brorsen	1851 IV Oct. 1-29660 B.3	294-4271 45-7378 73-9850	0-141938 1-0
249	P/Encke	1852 I Mar. 15-20794 A.5	183-4382 335-7810 13-1426	0-337553 0-847602 3-296440
250	Chacornac- Petersen- Bond	1852 II Apr. 20-08730 A.3	37-2113 318-5760 131-1191	0-905406 1-0
251	P/Biela	1852 III Sept. 24-22739 B.4	223-2245 247-2802 12-5507	0-860602 0-755922 6-620784
252	P/Westphal	1852 IV Oct. 13-24255 A.5	57-0543 347-5454 40-9377	1-250074 0-919815 61-5554

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
			$^{\circ}$	
253	Secchi	1853 I Feb. 24-52134 A.3	275-8868 70-9417 159-7550	1-092194 1-0
254	Schweizer	1853 II May 10-32628 A.5	199-2278 42-3203 122-1911	0-908693 0-989297 +0-0117781
255	Klinkerfues	1853 III Sept. 2-20688 A.5	170-4375 141-8696 61-5059	0-306839 1-000246 -0-0008031
256	Bruhns	1853 IV Oct. 17-10537 A.3	277-8391 221-4468 118-9957	0-172678 1-001229 -0-0071167
257	van Arsdale- Klinkerfues	1854 I Jan. 4-43514 A.0	170-9259 228-3823 113-8796	2-044645 1-0
258	de Me ^N ciaux	1854 II Mar. 24-51323 A.3	101-6296 316-7980 97-4816	0-277064 1-0
259	Klinkerfues- van Arsdale	1854 III July 22-49700 A.3	74-5696 349-0002 108-6967	0-648092 1-0
260	Klinkerfues etc.	1854 IV Oct. 28-01378 A.5	129-9183 325-8005 40-9064	0-798562 0-992455 +0-0094487
261	Colla- Winnecke- Dien	1854 V Dec. 16-21823 A.3	286-9822 239-4971 14-1488	1-357477 0-986373 +0-0100386
262	Schweizer	1855 I Feb. 5-54735 A.3	323-0952 191-0492 128-5827	2-193525 0-965185 +0-0158717
263	Donati- Dien- Klinkerfues	1855 II May 30-65404 A.5	22-5052 261-5476 156-8711	0-567564 0-985780 +0-0250544
264	P/Encke	1855 III July 1-53471 A.5	183-4313 335-7813 13-1464	0-337236 0-847731 3-295968
265	Bruhns	1855 IV Nov. 25-89265 A.3	325-5873 52-9310 169-8200	1-230994 1-0
266	d'Arrest	1857 I Mar. 21-86908 A.3	121-5706 314-4539 87-9429	0-772493 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
267	P/Brorsen	1857 II Mar. 29-7457 A.5	$^{\circ}$ 14-0198 103-0524 29-8006	0-620513 0-801757 5-537709
268	Klinkerfues	1857 III July 18-47426 A.3	134-0619 24-9939 121-0276	0-367535 1-0
269	Peters- Dien- Habicht	1857 IV Aug. 24-49650 A.5	180-9494 202-1282 32-7625	0-746842 0-980371 +0-0262823
270	Klinkerfues	1857 V Oct. 1-37992 A.3	124-8415 16-2549 123-9553	0-562896 0-996913 +0-0054832
271	Donati- van Arsdale	1857 VI Nov. 19-57129 A.3	95-1016 140-6048 142-1747	1-00899 0-996992 +0-0029814
272	P/d'Arrest	1857 VII Nov. 28-68788 A.5	174-6204 149-7183 13-9241	1-170003 0-659865 6-379738
273	P/Tuttle	1858 I Feb. 24-01939 A.5	206-7878 270-3438 54-4071	1-025550 0-821209 13-73783
274	P/Pons- Winnecke	1858 II May 2-53917 A.5	162-1643 114-7723 10-7970	0-768951 0-754857 5-555458
275	P/Tuttle- Giacobini- Kresák	1858 III May 3-44706 B.0	25-6490 176-6745 19-2563	1-145555 0-653750 6-01782
276	Bruhns	1858 IV June 5-79559 B.3	98-8618 326-2524 99-9655	0-544261 1-0
277	P/Faye	1858 V Sept. 13-37270 A.5	200-1374 210-9724 11-3600	1-694078 0-555789 7-447586
278	Donati	1858 VI Sept. 30-46448 A.5	129-1133 166-6054 116-9577	0-578469 0-996293 +0-0064076
279	Tuttle	1858 VII Oct. 13-31025 B.3	155-5369 161-0424 158-7114	1-427002 1-0
280	P/Encke	1858 VIII Oct. 18-86560 A.5	183-4661 335-7680 13-0828	0-340736 0-846394 3-303827

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
281	Tempel	1859 May 29-72559 A.3	$^{\circ}$ 282-0022 358-6150 95-4837	0-201032 1-000029 -0-0001448
282	Liais	1860 I Feb. 17-12491 B.1	209-7632 325-3187 79-6762	1-198875 1-0
283	Rümker	1860 II Mar. 6-06552 A.3	41-2149 10-1291 48-2297	1-306664 1-0
284	Italian Comet	1860 III June 16-06100 A.5	76-8774 85-9298 79-3235	0-292885 1-0
285	Tempel	1860 IV Sept. 22-8119 C.1	311-9671 46-0839 32-2056	0-68265 1-0
286	Thatcher	1861 I June 3-88992 A.5	213-4458 31-1696 79-7681	0-920700 0-983463 +0-0179612
287	Tebbutt	1861 II June 12-00674 A.5	330-0903 280-2109 85-4407	0-822384 0-985077 +0-0181457
288	Tuttle- Winnecke	1861 III Dec. 7-67443 A.3	331-5927 146-3353 138-0076	0-839027 1-0
289	P/Encke	1862 I Feb. 6-74774 A.5	183-4861 335-7606 13-0935	0-339958 0-846703 3-302469
290	Schmidt- Tempel	1862 II June 22-52959 A.3	27-1880 327-7599 172-1033	0-981327 1-0
291	P/Swift- Tuttle	1862 III Aug. 23-40888 A.2	152-7654 138-6853 113-5599	0-962637 0-960352 119-638
292	Respighi- Bruhns	1862 IV Dec. 28-67411 A.3	230-5760 356-9964 137-5347	0-803238 1-0
293	Bruhns	1863 I Feb. 3-99125 A.5	74-4615 118-1401 85-3584	0-794758 1-0
294	Klinkerfues- Donati	1863 II Apr. 5-40431 A.3	3-9878 252-4697 112-6272	1-068087 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
295	Respighi	1863 III Apr. 21·36467 A.5	$^{\circ}$ 55·5989 251·3835 85·4977	0·628781 0·999076 +0·0014701
296	Tempel- Schmidt	1863 IV Nov. 9·97939 A.3	357·2253 98·6890 78·0773	0·706588 0·998985 +0·0014365
297	Respighi	1863 V Dec. 28·26266 A.5	115·6746 305·9278 64·4863	0·771492 1·0
298	Baeker- Tempel	1863 VI Dec. 29·66656 A.5	78·1092 106·2365 83·3173	1·313120 1·000650 -0·0004949
299	Donati	1864 I July 28·31176 B.3	346·0951 176·1824 134·9887	0·626106 1·0
300	Tempel- Respighi	1864 II Aug. 16·07660 A.3	151·3843 96·7800 178·1283	0·909291 0·996351 +0·0040131
301	Donati- Toussaint	1864 III =4b Oct. 11·89205 A.5	232·4550 32·9662 109·7072	0·931212 0·999358 +0·0006894
302	Baeker- Chacornac	1864 IV =4d Dec. 22·95106 A.3	118·4565 204·4112 48·8680	0·770731 1·0
303	Bruhns	1864 V =4e Dec. 28·21884 A.5	178·5042 342·0850 162·8868	1·114634 1·0
304	Abbott	1865 I =5a Jan. 14·82531 A.3	111·7239 254·1269 92·4957	0·025844 1·0
305	P/Encke	1865 II =5b May 28·42453 A.5	183·5036 335·7462 13·0747	0·340954 0·846305 3·304107
⊕ 306	P/Tempel- Tuttle	1866 I =5f Jan. 11·63387 A.2	170·9349 232·5770 162·6927	0·976520 0·905420 33·17582
307	P/Faye	1866 II =5c Feb. 14·47351 A.5	200·2056 210·9071 11·3602	1·682139 0·557546 7·412932
308	P/Stephan- Oterma	1867 I =7a Jan. 20·70718 A.2	357·5553 79·5857 18·2102	1·577231 0·865352 40·091

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
309	P/Tempel (1)	1867 II =7b May 24-42448 A.4	135-1061 102-2568 6-4074	1-563541 0-509713 5-694922
310	Baeker- Winnecke	1867 III =7c Nov. 7-46080 A.3	148-6346 66-1425 96-5714	0-330359 1-0
311	P/Brorsen	1868 I =8a Apr. 17-92217 A.5	14-8220 102-3334 29-3708	0-597034 0-807973 5-482191
312	Winnecke	1868 II =8b June 26-97626 A.5	126-6357 53-4089 131-5547	0-578577 1-0
313	P/Encke	1868 III =8c Sept. 15-11396 A.5	183-6470 335-6858 13-1214	0-333623 0-849128 3-288304
314	P/Pons- Winnecke	1869 I =9a June 30-44327 A.5	162-4183 114-6352 10-8001	0-781518 0-751928 5-591675
315	Tempel	1869 II =9b Oct. 10-35395 B.3	188-2030 312-6299 111-6765	1-230762 1-0
316	P/Tempel- Swift	1869 III =9c Nov. 19-30926 A.5	106-1324 297-9746 5-4051	1-063267 0-658086 5-483887
317	Tempel- Winnecke	1870 I =0a July 14-58219 A.3	198-2238 142-8668 121-7890	1-008692 1-0
318	Coggia	1870 II =0b Sept. 2-69461 A.5	354-9525 14-0560 99-3609	1-816673 1-0
319	P/d'Arrest	1870 III =0c Sept. 23-17953 A.5	172-2872 147-5231 15-6489	1-279996 0-635021 6-567665
320	Winnecke	1870 IV =0d Dec. 20-37609 B.1	90-6155 95-8781 147-2716	0-389262 1-0
321	Winnecke- Borrelly- Swift	1871 I =1a June 11-09986 A.3	222-5131 280-4134 87-6017	0-654300 0-997814 +0-0033410
322	Tempel	1871 II =1b July 27-53445 A.5	96-3259 213-0044 109-9833	1-083363 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
323	P/Tuttle	1871 III =1 <i>d</i> Dec. 2·29825 A.5	206·7853 270·4103 54·2819	1·030103 0·821113 13·81826
324	Tempel	1871 IV =1 <i>e</i> Dec. 20·87222 A.5	242·8906 148·2300 98·3047	0·691267 0·995726 +0·0061827
325	P/Encke	1871 V =1 <i>c</i> Dec. 29·30708 A.5	183·6321 335·6909 13·1331	0·333019 0·849332 3·286034
326	Pogson	1872 Dec. 16·616 C.1	63·417 48·056 148·441	0·063659 1·0
327	P/Tempel (1)	1873 I =3 <i>a</i> May 10·29375 A.5	159·3771 79·7468 9·7671	1·771171 0·462621 5·983691
328	P/Tempel (2)	1873 II =3 <i>b</i> June 25·70792 A.5	185·1892 121·9838 12·7505	1·344127 0·552603 5·207406
329	P/Faye	1873 III =3 <i>f</i> July 18·987 <i>p</i> (ΔT small)	200·3675 210·7968 11·3553	1·682555 0·557383 7·411604
330	Borrelly	1873 IV =3 <i>c</i> Sept. 11·28371 A.5	193·7783 231·6642 95·9697	0·794061 0·996471 +0·0044442
331	Henry	1873 V =3 <i>d</i> Oct. 2·26718 A.5	233·7547 177·7976 121·4690	0·384913 0·999730 +0·0007007
332	P/Brorsen	1873 VI =3 <i>e</i> Oct. 10·97859 A.5	14·8472 102·3077 29·4052	0·593776 0·808859 5·475252
333	P/Crommelin	1873 VII =3 <i>g</i> Dec. 2·45949 B.4	196·1090 250·9131 28·7729	0·747047 0·919043 28·03128
334	Winnecke	1874 I =4 <i>a</i> Mar. 10·43463 A.1	269·5053 31·3579 58·8880	0·044568 1·0
335	Winnecke- Borrelly- Tempel	1874 II =4 <i>b</i> Mar. 14·43547 A.5	331·7289 275·1605 148·4110	0·885773 1·0
336	Coggia	1874 III =4 <i>c</i> July 9·35833 A.5	152·3745 119·7988 66·3476	0·675783 0·998820 +0·0017459

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
337	Coggia	1874 IV = 4e July 18-19949 A.3	149-5915 216-9223 34-1317	1-687979 0-962831 +0-0220197
338	Borrelly	1874 V = 4d Aug. 27-34358 A.3	92-6219 252-5741 41-8280	0-982649 0-998831 +0-0011897
339	Borrelly	1874 VI = 4f Oct. 19-44285 B.3	16-2745 283-0189 99-2185	0-508226 1-0
340	P/Pons- Winnecke	1875 I = 5b Mar. 12-60046 A.4	165-1790 112-4975 11-2807	0-829044 0-740998 5-726799
341	P/Encke	1875 II = 5a Apr. 13-48468 A.5	183-6563 335-6773 13-1315	0-332955 0-849402 3-287395
342	Borrelly- Pechüle	1877 I = 7a Jan. 19-67865 A.3	347-1645 188-2653 152-9011	0-807441 1-0
343	Winnecke- Block	1877 II = 7b Apr. 18-15619 A.5	63-1250 317-6379 121-1496	0-949980 0-998700 +0-0013679
344	Swift- Borrelly- Block	1877 III = 7c Apr. 27-30584 A.5	116-7730 347-0997 77-1852	1-009052 0-997924 +0-0020570
345	P/d'Arrest	1877 IV = 7d May 10-97991 A.5	173-0238 147-1166 15-7121	1-318122 0-627809 6-664762
346	Tempel	1877 V = 7f June 27-57027 B.1	103-2450 185-3001 115-7324	1-070450 1-0
347	Coggia	1877 VI = 7e Sept. 11-71822 A.3	143-2115 252-0134 102-2289	1-575904 1-0
348	Swift	1878 I = 8a July 21-19074 B.1	177-5835 103-2672 78-1781	1-391967 1-0
349	P/Encke	1878 II = 8c July 26-66749 A.5	183-6583 335-6720 13-1192	0-333479 0-849154 3-287028
350	P/Tempel (2)	1878 III = 8b Sept. 7-76084 A.5	185-1535 121-9854 12-7625	1-339667 0-553692 5-200467

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
351	P/Brorsen	1879 I = $9a$ Mar. 31·03483 A.5	$^{\circ}$ 14·9356 102·2791 29·3834	0·589842 0·809842 5·462978
352	Swift	1879 II = $9c$ Apr. 27·92251 A.3	3·7475 46·7544 107·0400	0·896547 1·0
353	P/Tempel (1)	1879 III = $9b$ May 7·61771 A.5	159·5476 79·7029 9·7682	1·771113 0·462551 5·982242
354	Hartwig	1879 IV = $9e$ Aug. 29·77874 B.1	84·2591 33·4189 107·7578	0·991480 1·0
355	Palisa	1879 V = $9d$ Oct. 5·12500 A.3	115·4493 88·1718 77·1305	0·989608 1·0
356	Gould	1880 I = $0a$ Jan. 28·11820 A.1	86·2462 7·0769 144·6603	0·005494 1·0
357	Schaeberle	1880 II = $0b$ July 2·23127 A.5	145·1834 258·2212 123·0626	1·814042 1·0
358	Hartwig- Harrington	1880 III = $0e$ Sept. 7·43507 A.5	323·1205 46·3014 141·9078	0·354634 1·0
359	P/Tempel- Swift	1880 IV = $0f$ Nov. 8·49833 A.5	106·1151 297·9321 5·4029	1·067185 0·657173 5·492215
360	Pechüle	1880 V = $0g$ Nov. 9·91488 C.1	11·6805 250·3436 60·7018	0·659590 1·0
361	P/Faye	1881 I = $0c$ Jan. 23·165 p (ΔT small)	201·1955 210·5943 11·3204	1·738140 0·549017 7·56636
362	Swift	1881 II = $1a$ May 20·94095 A.1	173·8008 127·4097 77·9380	0·591090 1·0
363	Tebbutt	1881 III = $1c$ June 16·93973 A.5	354·2408 271·9286 63·4245	0·734544 0·995935 + 0·0055346
364	Schaeberle	1881 IV = $1d$ Aug. 22·80598 A.5	122·1356 98·0174 140·2296	0·633542 1·0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
365	P/Denning (1)	1881 V = 1g Sept. 13·8127 A.2	312·5866 66·8405 6·8538	0·725276 0·828377 8·68743
366	Barnard	1881 VI = 1f Sept. 14·86534 B.3	6·2930 275·1237 112·8148	0·449200 1·0
367	P/Encke	1881 VII = 1e Nov. 15·79568 A.5	183·9068 335·5507 12·8938	0·343343 0·845400 3·309601
368	Swift	1881 VIII = 1h Nov. 20·27142 A.3	118·0081 182·3834 144·8288	1·922905 0·973331 +0·0138691
369	Wells	1882 I = 2b June 11·02963 A.3	208·9889 205·8916 73·8033	0·060763 0·999995 +0·0000899
370	Brilliant Comet	1882 II = 2d Sept. 17·72409 A.5	69·5865 346·9588 142·0045	0·0077507 0·999907 +0·0120248
371	Barnard	1882 III = 2e Nov. 13·4754 A.5	254·2947 250·0724 96·1482	0·955567 1·0
372	Brooks- Swift	1883 I = 3a Feb. 19·45327 A.3	110·9011 279·0736 78·0632	0·760062 1·0
373	P/Ross	1883 II = 4a Dec. 25·61139 A.2	137·5979 265·2141 114·6993	0·308575 0·980840 64·63013
374	P/Pons- Brooks	1884 I = 3b Jan. 26·21739 A.2	199·1832 255·0749 74·0417	0·775729 0·954996 71·5630
375	P/Barnard (1)	1884 II = 4c Aug. 16·97933 A.2	301·0510 6·0532 5·4691	1·279756 0·584214 5·39990
376	P/Wolf ~~(1)~~	1884 III = 4e Nov. 18·28312 A.5	172·6951 207·2965 25·2534	1·571970 0·560927 6·774261
377	P/Encke	1885 I = 4f Mar. 8·13466 A.5	183·9178 335·5352 12·9082	0·342310 0·845776 3·306753
378	Barnard	1885 II = 5b Aug. 6·03744 A.3	178·4590 93·1921 80·6560	2·507786 1·002852 -0·0011372

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
379	Brooks	1885 III = 5e Aug. 10·65737 A.5	$^{\circ}$ 42·8541 205·6669 59·1026	0·749149 0·982263 +0·0236766
380	P/Tuttle	1885 IV = 5c Sept. 11·79189 A.5	206·7767 270·5433 54·3304	1·024728 0·821546 13·76020
381	Brooks- Barnard	1885 V = 5h Nov. 26·00994 A.3	35·6100 263·1035 42·4421	1·079629 1·0
382	Fabry	1886 I = 5f Apr. 6·45561 A.5	126·5831 37·2640 82·6243	0·642384 1·000446 -0·0006944
383	Barnard	1886 II = 5g May 3·78683 A.5	119·6161 69·2121 84·4368	0·479270 1·000229 -0·0004778
384	Brooks	1886 III = 6b May 5·02025 A.3	38·7348 288·7927 100·1663	0·842811 1·013032 -0·0154625
385	P/Brooks (1)	1886 IV = 6c June 7·18459 A.2	176·8314 54·3439 12·7280	1·327721 0·578739 5·595435
386	Brooks	1886 V = 6a June 7·88583 A.5	201·2901 193·5046 87·6686	0·269807 0·996791 +0·0118945
387	P/Pons- Winnecke	1886 VI = 6d Sept. 4·88532 A.5	172·0646 104·9344 14·5250	0·885493 0·726178 5·815345
388	P/Finlay	1886 VII = 6e Nov. 22·88815 A.5	315·2286 53·2399 3·0324	0·997550 0·717865 6·648404
389	Barnard	1886 VIII = 7c Nov. 28·90563 A.5	31·9180 259·0972 85·5874	1·480714 1·0
390	Barnard- Hartwig- Pechüle	1886 IX = 6f Dec. 16·99670 A.5	86·3435 138·2707 101·6194	0·663324 1·000382 -0·0005765
391	Thome	1887 I = 7a Jan. 11·63144 B.1	58·347 325·505 128·472	0·009665 1·0
392	Brooks	1887 II = 7b Mar. 17·89038 A.5	159·4293 280·8144 104·2719	1·630145 0·983692 +0·0100039

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
393	Barnard	1887 III = $7d$ Mar. 28·92466 A.5	36° ·5344 136·3367 139·7840	1·006526 1·000419 -0·0004165
394	Barnard	1887 IV = $7e$ June 17·16338 A.5	15·1085 246·1270 17·5500	1·393813 0·996088 +0·0028068
395	P/Olbers	1887 V = $7f$ Oct. 8·97609 A.5	65·3464 85·3686 44·5713	1·199109 0·930974 72·4051
396	Sawerthal- Nolan	1888 I = $8a$ Mar. 17·50182 A.3	359·9138 246·2563 42·2502	0·698774 0·995847 +0·0059437
397	P/Encke	1888 II = $8b$ June 28·490 p (ΔT small)	183·9396 335·5248 12·8926	0·343091 0·845469 3·30821
398	Brooks	1888 III = $8c$ July 31·63638 A.3	59·2103 102·3608 74·1923	0·902226 0·999908 +0·0000102
399	P/Faye	1888 IV = $8d$ Aug. 20·44 p (ΔT = +2·6)		See note
400	Barnard	1888 V = $8f$ Sept. 13·27970 A.5	290·8019 138·3929 56·3469	1·527813 0·991399 +0·0056297
401	Barnard- Brooks	1889 I = $8e$ Jan. 31·66858 A.5	340·4619 358·2742 166·3777	1·814918 1·001255 -0·0006915
402	Barnard	1889 II = $9b$ June 11·30507 A.5	236·0740 311·5370 163·8469	2·255561 0·999675 +0·0001439
403	P/Barnard (2)	1889 III = $9c$ June 21·24439 C.2	60·1195 271·8324 31·2148	1·102397 0·956665 128·31
404	Davidson	1889 IV = $9e$ July 19·78576 A.5	345·8705 287·0100 65·9895	1·039728 0·997720 +0·0021928
405	P/Brooks (2)	1889 V = $9d$ Sept. 30·88505 A.5	343·6349 18·7914 6·0757	1·949857 0·470812 7·072763
406	P/Swift (1)	1889 VI = $9f$ Nov. 30·0722 A.2	69·7477 331·2694 10·2830	1·356238 0·684600 8·91684

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
407	Borrelly	1890 I = $9g$ Jan. 26-98058 A.3	199-8636 9-3046 56-7450	0-269764 1-0
408	Brooks	1890 II = $0a$ June 2-03303 A.5	68-9294 321-1804 120-5626	1-907583 1-000410 -0-0002151
409	Coggia	1890 III = $0b$ July 9-03728 A.5	85-6583 15-1373 63-3447	0-764087 1-0
410	Zona	1890 IV = $0e$ Aug. 7-38269 A.0	331-2691 86-2221 154-3072	2-046694 0-995872 +0-0020169
411	P/d'Arrest	1890 V = $0d$ Sept. 17-987 p ($\Delta T = -1.0$)	172-9806 147-1004 15-7044	1-32404 0-627125 6-69126
412	Denning	1890 VI = $0c$ Sept. 25-00803 A.5	163-0459 100-9591 98-9396	1-260224 0-999154 +0-0006712
413	P/Spitaler	1890 VII = $0f$ Oct. 27-02219 A.2	13-3478 45-8932 12-8403	1-817330 0-471297 6-37284
414	Barnard- Denning	1891 I = $1b$ Apr. 28-02100 A.5	178-7527 194-7563 120-5177	0-397896 1-0
415	P/Wolf ~~(A)~~	1891 II = $1c$ Sept. ~~A~~ 93038 A.5 ~~3~~	172-7968 207-2038 25-2361	~~1-592729~~ ~~1-603534~~ 0-557197 ~~6-891305~~ ~~6-822088~~
416	P/Encke	1891 III = $1d$ Oct. 18-479 p (ΔT small)	183-944 335-526 12-923	0-340473 0-846474 3-30255
417	Barnard	1891 IV = $1f$ Nov. 14-04268 A.3	269-5717 218-8281 77-9927	0-971089 1-0
~~(A)~~ 418	P/Tempel- Swift	1891 V = $1e$ Nov. 17-86894 B.4	106-6829 297-4003 5-3945	1-086419 0-652900 5-53750
419	Swift	1892 I = $2a$ Apr. 7-15224 A.5	24-5073 241-7251 38-7025	1-026848 0-998782 +0-0011862
420	Denning	1892 II = $2b$ May 11-72472 A.5	129-3235 254-2406 89-6970	1-970696 1-000345 -0-0001751

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
421	P/Holmes	1892 III = $2h$ June 13·89048 A.5	14·2861 332·5032 20·7947	2·140739 0·409532 6·903203
422	P/Pons- Winnecke	1892 IV = $2c$ July 1·388 p (ΔT small)	172·1370 104·8862 14·5233	0·886554 0·725991 5·81983
423	P/Barnard (3)	1892 V = $2f$ Dec. 11·00272 B.2	169·8807 207·2514 31·3054	1·434085 0·593813 6·63397
424	Brooks	1892 VI = $2e$ Dec. 28·5979 B.0	252·6917 265·3184 24·7966	0·975708 1·0
425	Brooks	1893 I = $2i$ Jan. 6·99126 A.5	85·2156 186·4483 143·8506	1·195186 1·001586 -0·0013273
426	Rordame- Quénisset	1893 II = $3a, c$ July 7·77146 A.5	47·1232 338·1405 159·9742	0·674549 0·999462 +0·0007974
427	P/Finlay	1893 III = $3b$ July 12·675 p ($\Delta T=0$)	315·3512 53·1376 3·0378	0·989138 0·719506 6·62217
428	Brooks	1893 IV = $3d$ Sept. 19·72233 A.3	347·4516 175·7157 129·8298	0·811991 0·996489 +0·0043244
429	P/Denning (2)	1894 I = $4a$ Feb. 9·95360 A.2	46·3230 85·0785 5·5293	1·147196 0·698400 7·41838
430	Gale	1894 II = $4b$ Apr. 13·53900 A.1	324·1879 207·1865 86·9720	0·983032 0·989889 +0·0102855
431	P/Tempel (2)	1894 III = $4c$ Apr. 23·7405 A.4	185·1083 121·9243 12·7350	1·350608 0·551077 5·21839
432	P/de Vico- E. Swift	1894 IV = $4e$ Oct. 12·70098 A.2	296·6833 49·4013 2·9692	1·391748 0·571578 5·855096
433	P/Encke	1895 I = $4d$ Feb. 5·24866 A.5	183·9563 335·5180 12·9112	0·343102 0·845331 3·303915
434	P/Swift (2)	1895 II = $5a$ Aug. 21·31594 A.2	167·7778 171·0665 3·0002	1·298018 0·652492 7·21897

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
435	Brooks	1895 III = 5d Oct. 21-55267 A.3	298-7764 83-8498 76-2460	0-843034 1-0
436	Perrine	1895 IV = 5c Dec. 18-82670 C.3	272-6669 321-2623 141-6169	0-191981 1-0
437	Perrine- Lamp	1896 I = 6a Feb. 1-28864 A.5	358-3606 209-6001 155-7422	0-587353 1-000647 -0-0011009
438	P/Faye	1896 II = 5b Mar. 19-76279 B.4	201-1953 210-5945 11-3204	1-740096 0-549017 7-57914
439	Swift	1896 III = 6b Apr. 18-14731 A.3	1-7393 179-0019 55-5665	0-566286 1-000476 -0-0008400
440	Sperra	1896 IV = 6d July 11-44275 A.3	41-0557 151-7416 88-4275	1-142895 1-0
441	P/Giacobini	1896 V = 6e Oct. 28-5313 A.0	140-5171 194-1919 11-3553	1-454714 0-588479 6-64628
442	P/Brooks (2)	1896 VI = 6c Nov. 4-17246 A.5	343-8213 18-7417 6-0654	1-959219 0-469461 7-096561
443	P/Perrine- Mrkos	1896 VII = 6g Nov. 25-12850 A.2	163-8742 247-3438 13-6696	1-110230 0-679281 6-44070
444	Perrine	1897 I = 6f Feb. 8-60357 A.5	172-3290 147-2255 146-1370	1-062782 1-000937 -0-0008816
445	P/d'Arrest	1897 II = 7a May 24-2809 A.5	173-0302 147-1071 15-7030	1-326998 0-626113 6-68645
446	Perrine	1897 III = 7b Dec. 9-14258 A.3	65-9039 32-7908 69-6049	1-356679 1-0
447	Perrine	1898 I = 8b Mar. 17-61895 B.3	47-2985 263-1625 72-5320	1-095113 0-979921 +0-0183350
448	P/Pons- Winnecke	1898 II = 8a Mar. 20-892p ($\Delta T=0$)	173-3751 101-5673 16-9908	0-924122 0-714761 5-83152

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
449	P/Encke	1898 III = 8c May 27-36087 A.5	183-9828 335-5056 12-9133	0-340702 0-846391 3-303230
450	P/Wolf ~~(2)~~	1898 IV = 8f July 5-06294 A.5	172-8671 207-1896 25-1989	1-603046 0-555334 6-844921
451	Giacobini	1898 V = 8g July 25-99660 A.3	22-3753 278-9903 166-8526	1-501318 1-0
452	Perrine	1898 VI = 8e Aug. 16-70558 A.5	205-6204 259-8270 70-0306	0-626438 1-0
453	Coddington- Pauly	1898 VII = 8d Sept. 14-54421 A.5	233-2620 74-7119 69-9345	1-701605 1-001034 -0-0006074
454	Chase	1898 VIII = 8j Sept. 20-62384 A.5	4-6306 96-5605 22-5055	2-284667 0-999355 +0-0002823
455	Perrine- Chofardet	1898 IX = 8h Oct. 21-03960 B.5	162-3672 35-6046 28-8547	0-420373 1-0
456	Brooks	1898 X = 8i Nov. 23-65791 A.5	123-5503 97-0375 140-3478	0-755969 0-999742 +0-0003412
457	Swift	1899 I = 9a Apr. 13-47785 A.5	8-7024 25-7037 146-2641	0-326571 1-000344 -0-0010528
458	P/Holmes	1899 II = 9d Apr. 28-59850 A.5	14-0890 332-4367 20-8087	2-128154 0-411336 6-873904
459	P/Tuttle	1899 III = 9b May 5-0140p ($\Delta T=0$)	206-6446 270-5343 54-4885	1-019130 0-821712 13-66667
460	P/Tempel (2)	1899 IV = 9c July 28-9918p (ΔT small)	185-6235 121-6543 12-6439	1-388530 0-542124 5-28094
461	Giacobini	1899 V = 9e Sept. 15-40029 A.5	10-7800 272-9233 76-9432	1-785838 1-0
462	Giacobini	1900 I = 0a Apr. 29-40593 C.1	24-3661 41-0805 146-4572	1-331858 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
463	Borrelly- Brooks	1900 II =0b Aug. 3·70031 A.5	12·4255 328·7136 62·5284	1·014835 1·000416 -0·0004095
464	P/Giacobini- Zinner	1900 III =0c Nov. 28·53069 A.2	171·1003 197·4065 29·8426	0·931850 0·733117 6·52436
465	Viscara	1901 I =1a Apr. 24·75135 A.5	203·0444 110·3297 131·0798	0·244812 1·0
⊗ 466	P/Encke	1901 II =1b Sept. 15·96174 A.5	183·9855 335·4977 12·8976	0·341618 0·846029 3·304867
467	Brooks	1902 I =2a May 7·622 C.1	228·3842 52·9245 66·5100	0·45119 1·0
468	P/Grigg- Skjellerup	1902 II =2c July 3·343 B.1	347·587 224·497 8·646	0·74554 0·73895 [4·82648]
469	Perrine- Borrelly	1902 III =2b Nov. 24·35672 A.5	152·9705 50·0299 156·3511	0·401074 0·999968 +0·0000798
470	Giacobini	1903 I =3a Mar. 16·50575 A.5	133·7091 2·9522 30·9351	0·410562 0·999666 +0·0008135
471	Giacobini	1903 II =2d Mar. 23·77958 C.3	5·7586 118·1175 43·8960	2·774317 1·0
472	Grigg	1903 III =3b Mar. 25·92031 B.3	184·9460 213·7921 66·4886	0·499420 1·0
473	Borrelly	1903 IV =3c Aug. 28·10410 B.3	127·3227 294·2047 85·0003	0·32966 1·0
474	P/Brooks (2)	1903 V =3d Dec. 6·28334 A.5	343·6467 18·7321 6·0677	1·958905 0·469757 7·100800
475	Brooks	1904 I =4a Mar. 7·63875 A.5	53·5348 276·4285 125·1297	2·707778 1·001365 -0·0005040
476	Giacobini	1904 II =4d Nov. 3·76011 A.5	40·7224 219·0890 99·6051	1·881737 1·0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
477	P/Tempel (2)	1904 III = 4c Nov. 10·935 _p ($\Delta T = +0\cdot01$)	$^{\circ}$ 185·7660 121·6186 12·6449	1·387865 0·542212 5·27867
478	P/Encke	1905 I = 4b Jan. 12·37927 A.5	184·6168 335·0658 12·5797	0·338903 0·847115 3·300382
479	P/Borrelly	1905 II = 4e Jan. 17·29158 A.0	352·3490 77·3822 30·4846	1·395356 0·615235 6·906116
480	Giacobini	1905 III = 5a Apr. 4·54518 A.5	358·2085 158·0577 40·2051	1·114640 0·969976 +0·0269362
481	Kopff	1905 IV = 6b Oct. 18·25027 A.5	158·6167 342·9053 4·2758	3·339887 1·001481 -0·0004433
482	Schaer	1905 V = 5b Oct. 26·26257 A.3	132·7014 223·5567 140·5811	1·052201 1·0
483	Brooks	1905 VI = 6a Dec. 22·79708 A.5	89·8579 287·0121 126·4402	1·296302 1·000185 -0·0001424
484	Giacobini	1906 I = 5c Jan. 22·85545 A.0	199·2027 92·6933 43·6600	0·215908 1·0
485	Ross	1906 II = 6c Feb. 21·43326 C.1	276·4576 72·6548 83·4602	0·722913 1·0
486	P/Holmes	1906 III = 6f Mar. 14·74607 A.5	14·3049 332·3742 20·8209	2·121406 0·412280 6·857717
487	P/Kopff	1906 IV = 6e May 3·14890 B.4	19·7408 264·3298 8·7126	1·698432 0·516524 6·58431
488	P/Finlay	1906 V = 6d Sept. 7·7878 _p ($\Delta T = +0\cdot54$)	315·8970 52·8994 3·0545	0·96503 0·72405 6·5398
489	P/Metcalf	1906 VI = 6h Oct. 10·3105 B.0	199·9893 195·1197 14·6195	1·632308 0·584003 7·77262
490	Thiele	1906 VII = 6g Nov. 21·72642 A.3	8·6320 85·4091 56·3892	1·212686 0·982624 +0·0006588

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
491	Giacobini	1907 I =7a Mar. 19-60647 A.5	317-1080 97-7778 141-6613	2-051674 1-001024 -0-0004991
492	P/Grigg- Mellish	1907 II =7b Mar. 27-6856 A.2	328-4249 189-8279 109-8375	0-923279 0-969224 164-317
493	P/Tuttle- Giacobini- Kresák	1907 III =7c May 28-78563 B.0	35-9895 168-4073 13-5600	1-147311 0-554237 4-12918
494	Daniel	1907 IV =7d Sept. 4-46145 A.3	294-4494 143-5897 8-9634	0-512173 0-998793 +0-0023568
495	Mellish	1907 V =7e Sept. 14-85633 C.3	294-3723 55-1942 119-6315	0-982949 1-0
⊗ 496	P/Encke	1908 I =8b May 1-40956 B.4	184-6197 335-0642 12-5944	0-337815 0-847533 3-298038
497	P/Tempel- Swift	1908 II =8d Oct. 1-376p ($\Delta T = +3-65$)	113-6387 290-9189 5-4449	1-153162 0-637793 5-68066
498	Morehouse	1908 III =8c Dec. 26-25609 A.5	171-5851 103-7540 140-1771	0-945300 1-000692 -0-0007324
499	Borrelly- Daniel	1909 I =9a June 5-75759 A.3	5-0017 306-1768 52-0760	0-842844 0-994762 +0-0062147
500	P/Pons- Winnecke	1909 II =9d Oct. 9-77339 B.2	172-2605 99-9044 18-2851	0-972830 0-701233 5-87566
501	P/Perrine- Mrkos	1909 III =9b Nov. 1-328 B.2	166-8422 242-8844 15-6735	1-17274 0-661702 6-4543
502	P/Daniel	1909 IV =9e Nov. 29-2313 B.0	3-4995 71-5407 19-4506	1-38177 0-602502 6-48114
503	Daylight Comet	1910 I =0a Jan. 17-58815 A.5	320-9024 89-3295 138-7817	0-128975 0-999995 +0-0000403
⊗ 504	P/Halley	1910 II =9c Apr. 20-1794p ($\Delta T = 0$)	111-7197 57-8431 162-2140	0-587165 0-967283 76-0289

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
505	Metcalf	1910 III =0b Sept. 16-78129 A.5	50-9648 290-0855 121-0527	1-948009 0-999812 +0-0000965
506	P/d'Arrest	1910 IV =0c Sept. 16-9060p ($\Delta T=0$)	173-7980 146-9218 15-7865	1-270021 0-636915 6-54189
507	P/Faye	1910 V =0e Nov. 1-96164 B.2	199-2722 206-8106 10-5893	1-655222 0-565605 7-43801
508	P/Brooks (2)	1911 I =0d Jan. 8-62998 A.5	343-5166 18-7534 6-0637	1-963070 0-468835 7-104931
509	Kiess	1911 II =1b June 30-65536 A.5	110-3251 157-9604 148-4221	0-683597 0-995541 +0-0065229
510	P/Encke	1911 III =1d Aug. 19-5286p ($\Delta T=0$)	184-6503 335-0444 12-5803	0-338432 0-847272 3-298589
511	Beljawsky	1911 IV =1g Oct. 10-76400 A.3	71-7066 89-1985 96-4646	0-303424 1-000170 -0-0005609
512	Brooks	1911 V =1c Oct. 28-23834 A.5	153-0162 293-5004 33-8060	0-489427 0-99704 +0-0060479
513	Quénisset	1911 VI =1f Nov. 12-84928 A.5	122-0321 35-7320 108-0956	0-787635 0-998212 +0-0022701
514	P/Schaumasse	1911 VII =1h Nov. 13-55951 B.2	44-1768 94-2216 17-6984	1-226264 0-695239 8-071088
515	P/Borrelly	1911 VIII =1e Dec. 18-48874 A.5	352-3735 77-3758 30-4418	1-402667 0-614074 6-929075
516	P/Wolf ~~(A)~~	1912 I =1a Feb. 24-25722 A.5	172-8317 207-1955 25-2621	1-587170 0-557977 6-804052
517	Gale	1912 II =2a Oct. 5-45828 A.5	25-6280 297-5344 79-8083	0-716114 0-999514 +0-0006780
518	Borrelly	1912 III =2c Oct. 21-45839 B.1	99-6795 144-3151 124-6407	1-10711 1-0

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
519	P/Tuttle	1912 IV =2b Oct. 28·97445 B.4	$^{\circ}$ 206·9532 270·2782 55·0485	1·030000 0·818399 13·50757
520	Lowe	1913 I =2d Feb. 6·23 C.1	279·3 303·4 80·4	0·4074 1·0
521	Schaumasse	1913 II =3a May 15·09776 A.3	52·9665 315·5716 152·3623	1·456832 0·995278 +0·0032414
522	P/Neujmin (1)	1913 III =3c Aug. 16·9747 A.5	346·2425 348·4145 14·8434	1·528790 0·775472 17·76709
523	Metcalf	1913 IV =3b Sept. 14·55383 A.3	117·7028 157·9386 143·3610	1·35612 0·997560 +0·0017994
524	P/Giacobini- Zinner	1913 V =3e Nov. 2·57185 C.2	171·4909 196·3931 30·7222	0·975898 0·720105 6·51051
525	P/Westphal	1913 VI =3d Nov. 26·76938 B.5	57·0617 347·3070 40·8725	1·254143 0·919706 61·73031
526	Zlatinsky	1914 I =4b May 8·87018 C.1	116·3951 33·1653 112·9653	0·543146 1·0
527	Kritzingen	1914 II =4a June 4·73916 B.3	72·2831 199·4126 23·9187	1·198152 1·0
528	Neujmin	1914 III =4c July 30·62062 A.5	14·0319 270·8117 71·0390	3·747131 1·003672 -0·0009799
529	Campbell- Westland- Lunt	1914 IV =4e Aug. 5·47539 A.5	270·3561 0·8836 77·8326	0·712833 0·998844 +0·0016216
530	Delavan	1914 V =3f Oct. 26·76650 A.5	97·4612 59·7002 68·0356	1·104454 1·000162 -0·0001465
531	P/Encke	1914 VI =4d Dec. 5·477p ($\Delta T = -0·05$)	184·6335 335·0470 12·5866	0·337911 0·847465 3·29723
532	P/Tempel (2)	1915 I =5c Apr. 15·16p ($\Delta T = -0·57$)	186·6643 121·1729 12·7515	1·322601 0·557829 5·17318

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
533	Mellish	1915 II = 5a July 17-65148 A.5	$247^{\circ}7737$ 72-7589 54-7904	1-005338 1-000235 -0-0002338
534	P/Pons- Winnecke	1915 III = 5b Sept. 1-510p ($\Delta T = +0.04$)	172-3444 99-8600 18-2950	0-971644 0-701439 5-87099
535	Mellish	1915 IV = 5d Oct. 13-8959 C.1	118-8398 78-1998 53-5452	0-44329 1-0
536	P/Taylor	1916 I = 5e Jan. 31-4168 A.2	354-8138 114-3636 15-5257	1-558037 0-546466 6-36704
537	P/Neujmin (2)	1916 II = 6a Mar. 11-81553 A.5	193-7749 328-0285 10-6320	1-339829 0-566493 5-433494
538	P/Perrine	1916 III = 6c June 14 C.1	95 224 103	0-470 0-927 16-35
539	Metcalf	1916 IV = 6e Sept. 18-685 C.1	94-9245 238-3022 18-9627	0-75287 1-0
540	P/Mellish	1917 I = 7a Apr. 11-17514 A.2	121-3070 87-9799 32-6831	0-190186 0-993120 145-340
541	Schaumasse	1917 II = 7b May 18-7081 C.3	119-1630 10-1451 158-7325	0-76415 1-0
542	Wolf	1917 III = 6b June 17-06938 A.5	120-6210 183-7579 25-6654	1-686453 0-999495 +0-0002993
543	P/Encke	1918 I = 7c Mar. 24-813p ($\Delta T = -0.2$)	184-6565 335-0477 12-5345	0-340865 0-846331 3-30363
544	Reid	1918 II = 8a June 5-775 C.1	194-1235 18-2706 70-1485	1-1014 1-0
545	P/Schorr	1918 III = 8d Sept. 29-1031 A.2	278-6744 118-3304 5-5821	1-882252 0-470759 6-70712
546	P/Borrelly	1918 IV = 8c Nov. 17-0894 A.2	352-3966 77-3688 30-4910	1-395755 0-615118 6-90593

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
547	P/Wolf ~~(1)~~	1918 V = 8b Dec. 13-98881 A.5	$^{\circ}$ 172-9342 207-1350 25-2888	1-582288 0-558646 6-788093
548	P/Kopff	1919 I = 9a June 28-71129 A.5	19-7123 264-2651 8-6948	1-707122 0-514784 6-599246
549	P/Finlay	1919 II = 9d Oct. 15-98261 B.0	318-2029 47-3061 3-3979	1-012500 0-714927 6-69360
550	P/Brorsen- Metcalf	1919 III = 9b Oct. 17-38163 A.5	129-5092 311-1766 19-1954	0-484915 0-971192 69-05972
551	P/Schaumasse	1919 IV = 9e Oct. 20-89588 A.5	45-7984 91-0428 14-7417	1-168402 0-706458 7-94114
552	Metcalf- Borrelly	1919 V = 9c Dec. 7-80965 A.5	185-7476 121-4041 46-3860	1-115272 1-000215 -0-0001929
553	Skjellerup	1920 I = 9g Jan. 3-174 C.0	276-5804 316-0173 123-1697	0-29769 1-0
554	P/Tempel (2)	1920 II = 0a, b June 10-696 B.0	186-6643 121-1730 12-7515	1-3205 0-55783 5-1609
555	Taylor- Skjellerup	1920 III = 0c Dec. 11-5229 C.1	340-8801 108-1850 22-1015	1-14865 1-0
556	P/Dubiago	1921 I = 1c May 5-35344 A.2	97-4347 66-4745 22-3359	1-115700 0-932373 67-0116
557	Reid	1921 II = 1a May 10-44308 A.3	64-4660 268-6605 132-1182	1-008461 0-998252 +0-0017333
558	P/Pons- Winnecke	1921 III = 1b June 13-42205 B.2	170-2883 98-5175 18-9255	1-040856 0-685247 6-01354
559	P/Encke	1921 IV = 1d July 13-782p ($\Delta T = -0.22$)	184-7194 335-0020 12-5214	0-340005 0-846712 3-30347
560	Reid	1921 V = 2a Oct. 28-76612 B.3	183-6932 274-8905 32-4444	1-629082 0-986968 +0-0079994

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
561	P/Grigg-Skjellerup	1922 I = $2b$ May 15-69521 A.5	355° 0077 215-8721 17-5102	0-888939 0-695175 4-980037
562	Baade	1922 II = $2c$ Oct. 26-53015 A.5	118-3039 220-8755 51-4614	2-258769 1-000865 -0-0003829
563	Skjellerup	1923 I = $2d$ Jan. 4-22319 A.3	264-4991 262-3430 23-3662	0-923590 0-993735 +0-0067836
564	P/d'Arrest	1923 II = $3b$ Sept. 14-62 p ($\Delta T = +0.95$)	174-1262 143-8823 18-0602	1-3525 0-6169 6-6323
565	Bernard-Dubiago	1923 III = $3a$ Nov. 17-84807 B.3	255-3301 227-0416 113-7960	0-777832 1-0
566	Reid	1924 I = $4a$ Mar. 13-99153 A.3	271-4581 114-3803 72-3246	1-756083 0-999573 +0-0002432
567	Finsler	1924 II = $4c$ Sept. 4-85296 A.3	66-5793 80-4118 120-1333	0-406136 1-001317 -0-0032423
568	P/Encke	1924 III = $4b$ Nov. 1-0 p ($\Delta T = +0.44$)	184-736 334-988 12-503	0-34099 0-84632 3-3051
569	P/Wolf (2) - HARRINGTON	1924 IV = $4d$ 1925 Jan. 10-95699 A.2	180-0920 260-6754 23-6779	2-427978 0-371169 7-586932
570	Orkisz	1925 I = $5c$ Apr. 1-51116 A.5	36-1925 318-4103 100-0185	1-109595 1-000629 -0-0005665
571	P/Schwassmann-Wachmann (1)	1925 II = $7j$ May 9-9723 E A.5	359-3159 323-0641 9-4372	5-476948 0-150360 16-36649
572	Reid	1925 III = $5b$ July 29-85514 A.5	259-2734 6-3369 26-9756	1-633208 0-995069 +0-0030192
573	P/Tempel (2)	1925 IV = $5d$ Aug. 7-04228 A.5	186-5834 121-1387 12-7710	1-313284 0-560086 5-158061
574	P/Faye	1925 V = $5h$ Aug. 6-66 p ($\Delta T = +0.90$)	199-7114 206-5878 10-6058	1-61373 0-571545 7-30952

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω	q
			Ω i	e P (or $1/a$)
575	Shajn- Comas Solá	1925 VI = 5a Sept. 6·97854 A.5	205·7623 357·8391 146·7030	4·180690 1·001941 -0·0004642
576	van Biesbroeck	1925 VII = 5j Oct. 2·97348 A.5	106·4019 334·9121 49·3242	1·566230 1·000428 -0·0002730
577	P/Borrelly	1925 VIII = 5f Oct. 7·536p ($\Delta T = +0·07$)	352·4312 77·3783 30·5114	1·388148 0·616450 6·88525
578	P/Brooks (2)	1925 IX = 5g Nov. 1·81142 A.5	195·7028 177·7703 5·5499	1·861649 0·487300 6·919133
579	P/Wolf ~~(2)~~	1925 X = 5e Nov. 7·96414 A.5	160·7368 204·4458 27·2981	2·434730 0·405238 8·282508
580	Peltier- Wilk	1925 XI = 5k Dec. 7·26739 A.3	126·1235 141·0782 144·6034	0·763569 1·000505 -0·0006610
581	Blathwayt	1926 I = 6b Jan. 2·99349 C.3	328·3816 136·4202 128·3559	1·346511 1·0 1·0
582	P/Kopff	1926 II = 6c Jan. 28·21135 A.5	19·6560 264·2518 8·7067	1·698040 0·516302 6·577489
583	Ensor	1926 III = 5l Feb. 11·97791 B.3	354·8456 282·7863 123·0087	0·323111 1·000513 -0·0015892
584	P/Tuttle	1926 IV = 6a Apr. 27·65p ($\Delta T = +1·09$)	206·977 270·136 54·958	1·0306 0·81854 13·5357
585	P/Finlay	1926 V = 6d Aug. 7·2p ($\Delta T = +0·7$)	320·6208 45·5944 3·4353	1·05806 0·70649 6·8444
586	P/Giacobini- Zinner	1926 VI = 6e Dec. 7·91p ($\Delta T = +3·75$)	171·7333 196·2801 30·7176	0·993711 0·716806 6·57300
587	Reid	1926 VII = 7b Dec. 30·58736 C.3	224·7766 108·9540 83·6430	0·754733 1·008658 -0·0114715
588	P/Neujmin (2)	1927 I = 6g Jan. 16·23360 A.5	193·7315 328·0027 10·6325	1·338169 0·566823 5·429598

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
589	Blathwayt	1927 II =7a Feb. 14-503 C.3	231-8486 19-1164 92-3572	1-03557 1-0
590	P/Comas Solá	1927 III =6f Mar. 22-19299 A.5	38-4788 65-9308 13-7632	1-772492 0-574960 8-515926
591	Stearns	1927 IV =7d Mar. 22-72349 A.5	11-1353 214-9520 87-6580	3-683732 0-998065 +0-0005253
592	P/Grigg- Skjellerup	1927 V =7e May 10-245 B.4	355-0330 215-8613 17-4861	0-892608 0-694211 4-98722
593	P/Gale	1927 VI =7f June 14-56808 A.0	209-8601 67-4032 11-6225	1-213456 0-757425 11-1884
594	P/Pons- Winnecke	1927 VII =7c June 21-07452 B.2	170-3936 98-4572 18-9476	1-039229 0-685636 6-01060
595	P/Schaumasse	1927 VIII =7g Oct. 1-3529 A.5	46-0163 90-9137 14-7191	1-172087 0-705860 7-95444
596	Skjellerup	1927 IX =7k Dec. 18-18340 B.3	47-1900 77-5458 85-1065	0-176311 1-0
597	P/Reinmuth (1)	1928 I =8a Jan. 31-07272 B.2	8-6670 125-2267 8-0606	1-86036 0-502786 7-23732
598	P/Encke	1928 II =7h Feb. 19-698p (ΔT small)	184-9240 334-8914 12-5343	0-332668 0-849503 3-28644
599	P/Crommelin	1928 III =8c Nov. 5-04578 B.4	195-9604 250-3007 28-8825	0-744935 0-919021 27-90071
600	P/Schwassmann- Wachmann (2)	1929 I =9a Mar. 23-1300 A.5	357-7120 126-3273 3-7284	2-090521 0-394547 6-415952
601	P/Forbes	1929 II =9c June 26-06535 A.5	259-5099 25-7661 4-6394	1-528363 0-555822 6-382707
602	P/Neujmin (3)	1929 III =9b June 28-7421 A.0	140-7916 158-5006 3-6853	2-042363 0-584538 10-89939

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
603	Schwassmann- Wachmann- Peltier	1930 I =0a Jan. 15·63361 A.3	⁰ 325·0882 147·8361 99·9069	1·087102 0·999655 +0·0003174
604	Wilk	1930 II =9d Jan. 22·30975 A.3	157·4949 179·2739 124·5168	0·672235 0·999028 +0·0014465
605	Wilk	1930 III =0c Mar. 28·79969 A.5	46·9527 90·5408 67·1416	0·481809 0·992193 +0·0162033
606	Beyer	1930 IV =0b Apr. 18·12119 A.5	24·6237 116·6710 71·9737	2·078673 1·000379 -0·0001824
607	Forbes	1930 V =0e May 10·43765 A.5	320·9721 278·5668 97·0897	1·15280 1·0
608	P/Schwassmann- Wachmann (3)	1930 VI =0d June 14·19560 <i>E</i> A.2	192·3276 77·0524 17·4039	1·011426 0·672673 5·43171
609	Nakamura	1930 VII =0g Aug. 28·6748 C.1	62·7604 229·6282 4·1632	0·40777 1·0
610	P/Tempel (2)	1930 VIII =0f Oct. 5·78961 A.5	186·5991 121·1212 12·7569	1·318690 0·558856 5·168251
⊗ 611	P/Neujmin (1)	1931 I =1d Apr. 30·0767 A.5	346·9630 347·5732 15·1507	1·527911 0·774925 17·6871
612	P/Encke	1931 II =1a June 3·11363 <i>E</i> A.5	184·9133 334·8974 12·5633	0·331867 0·849786 3·283833
613	Nagata	1931 III =1b June 11·76670 A.5	320·1491 191·5400 42·3017	1·046900 0·979173 +0·0198944
614	Ryves	1931 IV =1c Aug. 25·91629 A.3	168·0537 101·4631 169·2885	0·075216 0·998281 +0·0228542
615	Carrasco	1931 V =2c Nov. 30·66964 A.5	110·3085 18·0889 58·0683	2·330580 1·002217 -0·0009514
616	Houghton- Ensor	1932 I =2b Feb. 28·92880 A.5	303·5206 212·7838 74·2828	1·254433 0·972130 +0·0222174

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
617	P/Grigg-Skjellerup	1932 II = 2d May 12.59 B.0	355° 1937 215.7774 17.4427	0.90755 0.69051 5.0216
618	P/Kopff	1932 III = 2e Aug. 21.4108 A.5	19.7178 264.2057 8.7062	1.688183 0.518130 6.557439
619	P/Borrelly	1932 IV = 2j Aug. 27.796p ($\Delta T = -0.59$)	352.5570 77.3092 30.5301	1.385458 0.616806 6.87483
620	Peltier-Whipple	1932 V = 2k Sept. 1.85708 A.5	38.4711 344.7645 71.7143	1.037210 0.976549 +0.0226100
621	Geddes	1932 VI = 2g Sept. 21.07466 A.5	329.6995 215.3981 124.9941	2.313566 1.001376 -0.0005948
622	Newman	1932 VII = 2f Sept. 24.5593 C.3	69.8034 245.3914 78.3828	1.64707 1.0
623	P/Brooks (2)	1932 VIII = 2m Oct. 9.52707 A.5	195.8327 177.6973 5.5448	1.869997 0.486088 6.941106
624	P/Faye	1932 IX = 2l Dec. 6.23358 E A.5	200.0667 206.4668 10.5812	1.619990 0.570435 7.323613
625	Dodwell-Forbes	1932 X = 2n Dec. 30.53031 A.5	327.3463 77.9035 24.5017	1.130788 0.972386 +0.0244198
626	Peltier	1933 I = 3a Feb. 6.689 C.1	135.9766 311.7683 86.6697	1.00060 1.0
627	P/Pons-Winnecke	1933 II = 3b May 18.3030 B.4	169.2628 96.8574 20.1334	1.101956 0.669599 6.09093
628	P/Giacobini-Zinner	1933 III = 3c July 15.1466 A.5	171.7698 196.2433 30.6839	0.999516 0.716002 6.602549
629	P/Whipple	1933 IV = 3f Aug. 1.40362 A.5	190.5488 188.8008 10.2129	2.496945 0.348118 7.496522
630	P/Wolf ~~45~~	1934 I = ~~2f~~ 3e Feb. 28.26219 A.5	160.8110 204.4099 27.2634	2.450265 0.403667 8.328868

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
631	Jackson	1934 II =5b Sept. 6·9205 C.3	$^{\circ}$ 124·3028 73·5044 141·9481	3·48570 1·0
632	P/Encke	1934 III =4a Sept. 15·2816 <i>E</i> A.5	184·9459 334·8823 12·5599	0·331861 0·849806 3·284399
633	Johnson	1935 I =5a Feb. 26·46876 A.5	18·3899 91·7516 65·4259	0·811148 0·991301 +0·0107246
634	P/Reinmuth (1)	1935 II =4b Apr. 29·8732 B.4	8·7885 125·1723 8·0613	1·855811 0·503717 7·23115
635	P/Schwassmann- Wachmann (2)	1935 III =4c Aug. 28·5958 A.5	357·9869 126·2902 3·7286	2·094675 0·393868 6·424276
636	P/Comas Solá	1935 IV =5c Oct. 8·383 _p ($\Delta T = -1·78$)	38·786 65·708 13·722	1·77726 0·57461 8·5395
637	van Biesbroeck	1936 I =5d May 11·63398 A.5	44·9007 299·8609 66·1083	4·04335 1·00197 -0·0004872
638	Peltier	1936 II =6a July 8·95507 A.5	148·4708 134·2434 78·5494	1·099870 0·991760 +0·0074923
639	Kaho- Kozik- Lis	1936 III =6b July 15·82032 A.5	45·8573 264·3117 121·9417	0·518403 0·994386 +0·0108298
640	P/Jackson- Neujmin	1936 IV =6c Oct. 3·4169 <i>E</i> B.2	197·3187 164·4330 13·2863	1·462608 0·650697 8·56836
641	Hubble	1936 V =7g Nov. 14·15727 A.5	147·4152 97·1230 11·5808	1·952783 0·972343 +0·0141630
642	P/Daniel	1937 I =7a Jan. 28·586 _p ($\Delta T = -0·71$)	6·016 70·491 19·825	1·53639 0·57298 6·8245
643	Wilk- Peltier	1937 II =7c Feb. 21·84934 C.3	32·1844 57·0422 26·3340	0·621478 1·0
644	P/Grigg- Skjellerup	1937 III =7e May 22·51 _p ($\Delta T = +0·54$)	355·2704 215·7445 17·4454	0·907783 0·69045 5·02200

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
645	Whipple	1937 IV = 7b June 20-06136 A.5	107-7270 127-9148 41-5559	1-733795 1-000160 -0-0000923
646	Finsler	1937 V = 7f Aug. 15-66139 C.3	114-8290 58-7255 146-4135	0-862774 0-999708 +0-0003384
647	P/Encke	1937 VI = 7h Dec. 27-7538 E A.5	184-9393 334-8810 12-5488	0-332391 0-849604 3-285634
648	P/Gale	1938 = 8a June 18-4733 B.4	209-1162 67-2537 11-7254	1-182888 0-760730 10-99216
649	Kozik- Peltier	1939 I = 9a Feb. 6-8535 A.5	169-0309 288-9120 63-5211	0-716496 0-995103 +0-0068347
650	P/Kopff	1939 II = 9e Mar. 12-4118p ($\Delta T = +0.37$)	19-8054 264-1534 8-7160	1-68460 0-51908 6-55592
651	Jurlof- Achmarof- Hassel	1939 III = 9d Apr. 10-16887 E A.5	89-2465 311-5837 138-1164	0-528266 0-998482 +0-0028758
652	P/Väisälä (1)	1939 IV = 9b Apr. 26-0826 A.5	44-3449 135-5634 11-2707	1-762299 0-634239 10-57606
653	P/Pons- Winnecke	1939 V = 9c June 22-71288 A.5	169-3489 96-7978 20-1228	1-101475 0-669681 6-08923
654	P/Herschel- Rigollet	1939 VI = 9h Aug. 9-46395 A.2	29-2989 355-2831 64-2009	0-748492 0-974176 156-044
655	P/Brooks (2)	1939 VII = 9g Sept. 15-41545 A.5	195-6864 177-7020 5-5456	1-871490 0-486038 6-948407
656	P/Kulin	1939 VIII = 0a Oct. 3-5212 B.2	292-7546 137-6336 4-8020	1-749440 0-447694 5-63740
657	Friend	1939 IX = 9n Nov. 5-647 C.3	126-849 196-420 92-932	0-94546 1-0
658	P/Tuttle	1939 X = 9k Nov. 10-08p ($\Delta T = +0.7$)	206-9611 269-8431 54-6542	1-022255 0-820634 13-6059

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
659	P/Giacobini-Zinner	1940 I = 9l Feb. 17.2017 A.5	171.7910 196.2499 30.7413	0.995613 0.716661 6.586828
660	P/Faye	1940 II = 9m Apr. 24.95236 E A.5	200.5396 206.3732 10.5517	1.653686 0.565231 7.418082
661	Okabayasi-Honda	1940 III = 0e Aug. 15.8440 B.3	329.8391 127.3947 133.1241	1.06372 1.00345 -0.003243
662	Whipple-Paraskevopoulos	1940 IV = 0d Oct. 7.865 C.1	235.3488 134.3135 55.1001	1.08590 1.0 1.0
663	Cunningham	1941 I = 0c Jan. 16.2314 C.3	199.5794 295.8900 49.8732	0.368043 1.0 1.0
664	Friend-Reese-Honda	1941 II = 1a Jan. 20.38393 B.3	132.7424 329.0975 26.2766	0.941885 0.981782 +0.0193416
665	P/Whipple	1941 III = 0b Jan. 22.691p ($\Delta T = -0.23$)	190.468 188.814 10.223	2.4848 0.34995 7.4736
666	de Kock-Paraskevopoulos	1941 IV = 1c Jan. 27.6535 B.3	268.6736 42.3917 168.1955	0.790003 0.998854 +0.0014500
667	P/Encke	1941 V = 1b Apr. 17.1426 A.5	185.1577 334.7674 12.3511	0.341351 0.846182 3.305920
668	P/Schwassmann-Wachmann (1)	1941 VI Apr. 21.3882 E A.5	356.2279 322.0031 9.5168	5.522837 0.135495 16.14701
669	P/du Toit-Neujmin-Delporte	1941 VII = 1e July 21.21358 A.2	69.3378 229.6075 3.2606	1.305019 0.583105 5.538411
670	van Gent	1941 VIII = 1d Sept. 3.18426 E A.5	85.3286 256.8624 94.5188	0.874789 1.000244 -0.0002793
671	P/Schwassmann-Wachmann (2)	1942 I = 1f Feb. 13.7608p ($\Delta T = -0.035$)	358.0084 126.0433 3.7252	2.143815 0.385449 6.51544
672	P/Väisälä (2)	1942 II = 2c Feb. 15.8162 C.2	335.2178 171.5925 38.0067	1.2871 0.93369 85.52

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
673	P/Forbes	1942 III = $2e$ Apr. 16·9025 p ($\Delta T = -0.5$)	259° ·6206 25·5961 4·6236	1·5487 0·55205 6·4285
674	Whipple- Bernasconi- Kulin	1942 IV = $2a$ Apr. 30·83332 A.5	223·4174 340·2358 79·4457	1·445303 1·000893 -0·0006178
675	P/Grigg- Skjellerup	1942 V = $2d$ May 23·250 p (ΔT small)	356·3627 215·3974 17·6224	0·856083 0·703677 4·91050
676	P/Wolf ~~(f)~~	1942 VI June 23·56252 A.5	160·9685 204·3420 27·3031	2·437385 0·404776 8·286388
677	P/Oterma	1942 VII = $3b$ Aug. 21·7241 E A.5	354·7890 155·1711 3·9899	3·389446 0·144443 7·885331
678	Oterma	1942 VIII = $2b$ Sept. 27·516 B.3	163·6970 280·3839 172·5138	4·112741 1·0
679	P/Stephan- Oterma	1942 IX = $2f$ Dec. 19·19666 B.2	358·3641 78·5895 17·8909	1·595861 0·861140 38·9611
680	Whipple- Fedtke- Tevzadze	1943 I = $2g$ Feb. 6·71867 A.3	39·8221 100·1182 19·7138	1·353628 0·992172 +0·0057830
681	Daimaca	1943 II = $3c$ Aug. 21·5465 C.1	36·3926 82·6685 161·3184	0·75830 1·0
682	P/d'Arrest	1943 III = $3e$ Sept. 23·774 p ($\Delta T = -1.2$)	174·4003 143·6293 18·0114	1·385798 0·610627 6·71431
683	P/Daniel	1943 IV = $3h$ Nov. 22·50859 B.4	6·1035 70·4328 19·8461	1·526564 0·574673 6·799675
684	P/Schaumasse	1943 V = $4a$ Nov. 25·8050· B.4	50·9175 86·9276 12·0818	1·202971 0·704347 8·20748
685	van Gent- Peltier- Daimaca	1944 I = $3f$ Jan. 12·459 B.1	33·399 58·010 136·055	0·87218 1·0
686	P/Comas Solá	1944 II = $3d$ Apr. 11·619 p ($\Delta T = -0.16$)	38·860 65·726 13·731	1·7657 0·57593 8·4962

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
687	P/du Toit (1)	1944 III = 4c June 17-49510 A.2	257°0198 22-4539 18-7455	1-276941 0-788059 14-7888
688	van Gent	1944 IV = 4d July 17-61350 A.5	336-9778 202-8027 95-0164	2-225936 1-002085 -0-0009369
689	Väisälä	1945 I = 4b Jan. 3-6557 B.3	239-1321 28-4314 17-2726	2-400280 1-0
690	P/du Toit (2)	1945 II = 5c Apr. 18-71651 E A.2	201-5286 358-8591 6-9192	1-249775 0-587621 5-27597
691	du Toit	1945 III = 5d May 17-1455 C.3	280-1413 254-2932 156-5093	0-998063 1-0
692	P/Pons- Winnecke	1945 IV = 5a July 10-5854 A.4	170-1081 94-4551 21-6938	1-159230 0-654913 6-15689
693	P/Kopff	1945 V = 5b Aug. 11-2676 A.5	31-5393 253-1185 7-2228	1-495675 0-556076 6-184330
694	Friend- Peltier	1945 VI = 5f Dec. 17-282 C.0	216-72 325-47 49-48	0-1945 1-0
695	du Toit	1945 VII = 5g Dec. 28-012 B.1	50-93 321-69 137-02	0-006305 1-0
696	Timmers	1946 I = 6a Apr. 13-26405 E A.5	54-3235 128-9679 72-8474	1-724132 1-001177 -0-0006827
697	Pajdušáková- Rotbart- Weber	1946 II = 6d May 11-4359 B.1	22-26 301-30 169-57	1-018251 1-0
698	P/Tempel (2)	1946 III = 6b July 2-34364 B.4	190-8549 119-4163 12-4310	1-393315 0-542233 [5-310159]
699	P/Brooks (2)	1946 IV = 6e Aug. 25-7931 A.5	195-6079 177-6957 5-5393	1-878849 0-484597 6-960127
⊗ 700	P/Giacobini- Zinner	1946 V = 6c Sept. 18-4866 A.5	171-8107 196-2941 30-7286	0-995708 0-716782 6-591974

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
701	Jones	1946 VI = $6h$ Oct. 26·76997 <i>E</i> A.5	320° ·4217 237·6345 56·9684	1·136222 1·000794 -0·0006990
702	Bester	1947 I = $6k$ Feb. 7·4216 B.3	348·6415 34·8615 108·1684	2·407373 1·0
⊗ 703	P/Grigg- Skjellerup	1947 II = $7a$ Apr. 18·13701 B.4	356·4011 215·3747 17·6456	0·853130 0·704259 4·89953
704	Bečvár	1947 III = $7c$ May 3·9198 B.1	182·13 322·38 129·15	0·961836 1·0
705	Rondanina- Bester	1947 IV = $7b$ May 20·96694 B.3	303·7646 353·2048 39·2917	0·559816 0·997503 +0·0044607
706	Bester	1947 V = $7d$ May 31·11554 B.3	357·3970 232·3663 111·4114	1·402874 1·0
⊗ 707	Wirtanen	1947 VI = $7h$ July 18·45980 B.3 3	9·3839 311·0980 97·3270	2·827976 1·001045 -0·0003694
⊗ 708	P/Reinmuth (2)	1947 VII = $7j$ Aug. 19·5152 <i>E</i> A.5	43·9346 297·3674 7·1261	1·866593 0·468926 6·589339
709	Wirtanen	1947 VIII = $8k$ Sept. 3·92662 B.3	73·5236 121·4251 155·0732	3·266529 1·0
⊗ 710	P/Faye	1947 IX = $7f$ Sept. 28·42152 <i>E</i> A.5	200·5332 206·3512 10·5334	1·663247 0·563718 7·443629
711	Honda	1947 X = $7m$ Nov. 17·906 B.1	221·2407 311·9618 106·2863	0·75309 1·0
⊗ 712	P/Encke	1947 XI = $7i$ Nov. 26·32673 A.5	185·1902 334·7432 12·3513	0·341016 0·846295 3·304682
713	Southern Comet	1947 XII = $7n$ Dec. 2·58734 A.3	196·2059 336·6043 138·5129	0·110071 1·000032 -0·0002907
⊗ 714	P/Wirtanen	1947 XIII = $8b$ Dec. 2·93263 A.5	343·5197 86·5103 13·3565	1·634961 0·540484 6·711351

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No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
715	Bester	1948 I = $7k$ Feb. 16-4150 B.3	$350^{\circ}2122$ 270-7366 140-5690	0-748329 1-0
716	Mrkos	1948 II = $8a$ Feb. 16-68851 B.3	61-9223 198-5928 77-5400	1-499362 1-0
717	Johnson	1948 III = $8j$ Apr. 9-02297 B.3	191-8477 139-7197 53-2438	4-709302 1-0
718	Honda- Bernasconi	1948 IV = $8g$ May 15-90624 B.3	317-0430 203-1610 23-1615	0-207707 1-0
719	Pajdušáková- Mrkos	1948 V = $8d$ May 16-6233 B.3	66-9066 246-9482 92-9194	2-106870 1-0
720	P/Whipple	1948 VI = $7g$ June 25-7933 B.4	190-1272 188-5978 10-2474	2-448965 0-355569 7-408139
721	P/Schwassmann- Wachmann (2)	1948 VII = $7l$ Aug. 23-62152 B.4	358-1140 126-0115 3-7237	2-151956 0-383775 6-525913
722	P/Forbes	1948 VIII = $8e$ Sept. 16-1212 E A.4	259-7387 25-4443 4-6207	1-545253 0-552716 [6-421324]
723	P/Ashbrook- Jackson	1948 IX = $8i$ Oct. 4-7793 E A.2	348-9042 2-3412 12-5132	2-311016 0-395537 7-47567
724	Bester	1948 X = $8m$ Oct. 22-93672 C.3	274-2554 66-9469 87-6233	1-274137 1-0
725	Eclipse Comet	1948 XI = $8l$ Oct. 27-42712 A.5	107-2618 210-3318 23-1222	0-135420 0-999935 +0-0004815
726	P/Honda- Mrkos- Pajdušáková	1948 XII = $8n$ Nov. 17-7086 E B.4	184-1047 233-0918 13-1632	0-559024 0-814293 5-22281
727	P/Neujmin (1)	1948 XIII = $8f$ Dec. 15-93892 A.5	346-6889 347-1738 15-0036	1-547391 0-774463 17-97108
728	Wirtanen	1949 I = $8h$ May 1-11702 B.3	229-9279 119-8925 130-2685	2-517909 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
729	P/Johnson	1949 II =9d Sept. 16·19473 B.2	206°·0175 118·1931 13·8752	2·248002 0·377008 6·85443
730	P/Wilson- Harrington	1949 III =9g Oct. 13·1658 C.1	91·9458 278·6525 2·1965	1·027551 0·412180 2·31121
731	Bappu- Bok- Newkirk	1949 IV =9c Oct. 26·42974 B.3	89·4887 309·0238 105·7731	2·058879 1·0 —
732	P/Väisälä (1)	1949 V =9h Nov. 11·2782 A.5	44·3340 135·4651 11·2804	1·752058 0·635232 10·52685
733	P/Shajn- Schaldach	1949 VI =9e Nov. 26·90548 E A.2	215·2968 167·3944 6·1530	2·234134 0·405164 7·278932
734	Johnson	1950 I =9a Jan. 19·31726 B.3	40·0973 221·6317 131·3542	2·553225 1·000671 —0·0002627
735	P/d'Arrest	1950 II =0a June 6·595p ($\Delta T = -0·2$)	174·4318 143·6137 18·0545	1·377873 0·612275 6·69929
736	P/Oterma	1950 III July 16·4856 E A.5	354·7913 155·1305 3·9886	3·404882 0·142763 7·915924
737	P/Reinmuth (1)	1950 IV =9f July 23·7442p ($\Delta T = -1·08$)	12·8760 123·5994 8·3896	2·03730 0·476943 7·68705
738	P/Daniel	1950 V =0d Aug. 23·9163 E B.4	7·2520 69·7465 19·7009	1·464704 0·586295 [6·661755]
739	P/Wolf ~~(1)~~	1950 VI =0c Oct. 23·6522 A.5	161·1456 203·8793 27·3162	2·497584 0·396372 8·416402
740	P/Arend- Rigaux	1950 VII =1b Dec. 18·9235 A.2	326·2710 124·7144 17·1898	1·386497 0·610388 6·71317
741	Minkowski	1951 I =0b Jan. 15·04006 A.5	192·4596 38·1822 144·1505	2·572433 1·001304 —0·0005068
742	Pajdušáková	1951 II =1a Jan. 30·49223 A.3	68·7218 310·5008 87·8858	0·719848 1·003119 —0·0043334

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
⊗ 743	P/Encke	1951 III =0e Mar. 16-2089 A.5	$^{\circ}$ 185-2108 334-7398 12-3805	0-338003 0-847462 3-298493
744	P/Tuttle- Giacobini- Kresák	1951 IV =1f May 9-37136 A.2	37-9425 165-6358 13-7930	1-116522 0-640888 5-482229
745	P/Neujmin (3)	1951 V =1g May 28-372p ($\Delta T = -1.47$)	144-807 156-197 3-761	2-03160 0-58799 10-94953
⊗ 746	P/Pons- Winnecke	1951 VI =1c Sept. 8-6114 B.4	170-2266 94-4012 21-6809	1-160607 0-653246 6-123434
747	P/Kopff	1951 VII =1e Oct. 20-3975 A.5	31-7353 253-0186 7-2202	1-494908 0-556224 6-182658
748	P/Tempel (2)	1951 VIII =1d Oct. 25-323p ($\Delta T = +0.2$)	190-9927 119-3820 12-4327	1-391232 0-542620 5-30498
749	P/Harrington- Wilson	1951 IX =2a Oct. 30-370 B.2	342-989 127-834 16-375	1-66524 0-51597 6-38126
750	P/Arend	1951 X =1j Nov. 23-42307 E A.2	44-4940 357-6944 21-7004	1-821056 0-535685 7-76723
751	Wilson- Harrington	1952 I =1i Jan. 12-94737 A.0	269-6041 76-1815 152-5323	0-740426 0-999820 +0-0002438
752	WOLF P/Harrington ~~(A)~~ A	1952 II =1k Feb. 6-68342 A.2	186-9059 254-2770 18-4940	1-599111 0-540714 6-49670
753	P/Schaumasse	1952 III =1l Feb. 10-6574 B.4	51-8338 86-3808 12-0310	1-194195 0-705648 8-17170
⊗ 754	P/Grigg- Skjellerup	1952 IV =2b Mar. 11-14142 B.4	356-3294 215-4232 17-6349	0-855697 0-703573 4-904602
755	Mrkos	1952 V =2c June 8-67215 A.3	144-8555 121-6538 112-0223	1-282517 0-981763 +0-0142194
756	Peltier	1952 VI =2d July 15-2577 C.3	96-5895 187-9428 45-5644	1-202005 1-0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
757	P/Comas Solá	1952 VII = 1 <i>h</i> Sept. 10-698 <i>p</i> ($\Delta T = -0.4$)	39-9298 62-9372 13-4608	1-766358 0-577681 8-55376
758	Harrington	1953 I = 2 <i>e</i> Jan. 5-41701 B.4	191-6310 220-6901 59-1204	1-664975 0-995947 +0-0024341
759	Mrkos	1953 II = 2 <i>f</i> Jan. 24-85731 B.3	253-8217 342-8868 97-1764	0-777749 1-000660 -0-0008486
760	Mrkos- Honda	1953 III = 3 <i>a</i> May 26-3947 C.3	85-7111 275-2028 93-8491	1-02245 1-0
761	P/Borrelly	1953 IV = 4 <i>b</i> June 8-7304 B.4	350-7279 76-2147 31-1125	1-448467 0-604383 7-00568
762	P/Brooks (2)	1953 V = 3 <i>b</i> Aug. 7-36162 A.5	195-6918 177-6806 5-5509	1-866110 0-486654 6-930915
763	P/Harrington	1953 VI = 3 <i>e</i> Sept. 22-1260 <i>E</i> B.2	219-3599 136-6222 11-6011	1-694011 0-535980 6-975393
764	P/Finlay	1953 VII = 3 <i>i</i> Dec. 25-87253 <i>E</i> A.4	321-0836 45-3897 3-4400	1-048942 0-708045 6-810109
765	Harrington	1954 I = 4 <i>c</i> Jan. 18-0997 <i>E</i> B.5	1-4262 292-0390 136-6415	2-060608 1-0
766	Pajdušáková	1954 II = 3 <i>h</i> Jan. 24-66539 C.3	94-0709 114-5845 13-5739	0-072091 1-0
767	P/Honda- Mrkos- Pajdušáková	1954 III = 4 <i>a</i> Feb. 5-1067 <i>E</i> B.4	184-1410 233-0836 13-1950	0-555646 0-815126 5-210552
768	P/van Biesbroeck	1954 IV = 4 <i>i</i> Feb. 20-80986 A.2	134-3373 148-9757 6-5905	2-414935 0-550031 12-43323
769	Abell	1954 V = 5 <i>b</i> Mar. 24-31715 C.3	73-8689 320-6669 123-9149	4-500594 1-0
770	P/Reinmuth (2)	1954 VI = 3 <i>d</i> Mar. 27-0767 <i>E</i> A.5	44-2501 297-2083 7-1168	1-868121 0-468547 6-590375

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
771	P/Pons- Brooks	1954 VII = 3c May 22-89047 A.2	199-0233 255-1913 74-1782	0-773930 0-954802 70-85674
772	Vozárová	1954 VIII = 4f June 1-9343 B.3	357-2280 122-1855 116-1581	0-677080 1-0
♁ 773	P/Encke	1954 IX = 3f July 2-52001 A.5	185-1991 334-7460 12-3740	0-338402 0-847302 3-299142
♁ 774	Abell	1954 X = 3g July 7-34941 A.0	194-3991 2-3149 53-2146	0-970385 1-0
♁ 775	P/Wirtanen	1954 XI = 4j Aug. 13-50549 E A.5	343-5216 86-4859 13-3771	1-625240 0-542099 6-686164
776	Kresák- Peltier	1954 XII = 4d Aug. 29-6718 B.1	254-7204 74-8671 88-5567	0-746437 1-0
777	P/Harrington- Abell	1954 XIII = 5a Dec. 13-1469 E B.2	338-3479 145-9131 16-8168	1-777389 0-523438 7-202698
778	P/Schwassmann- Wachmann (2)	1955 I = 4g Feb. 27-2926p ($\Delta T = -0.17$)	357-8555 126-0080 3-7250	2-150081 0-384536 6-52947
♁ 779	P/Faye	1955 II = 4e Mar. 4-671 E A.5	200-5841 206-3124 10-5536	1-651830 0-565406 7-410060
780	Mrkos	1955 III = 5e June 4-1658 B.3	32-5053 48-2431 86-4988	0-534389 0-989306 +0-0200116
♁ 781	Bakharev- Macfarlane- Krienke	1955 IV = 5f July 11-54484 B.1	13-2319 303-8239 50-1275	1-428936 1-002788 -0-0019511
782	Honda	1955 V = 5g Aug. 4-0523 C.1	348-1852 338-7200 107-5026	0-884611 1-0
783	Baade	1955 VI = 4h Aug. 13-21090 B.3	144-6542 264-6402 100-3908	3-870352 1-0
784	P/Perrine- Mrkos	1955 VII = 5i Sept. 27-3509 B.4	167-7804 242-5630 15-8799	1-154032 0-667499 6-46601

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
785	P/Whipple	1955 VIII = $5d$ Nov. 29-6926 B.4	$190^{\circ}4345$ 188-5091 10-2507	2-449952 0-355800 7-416606
786	Haro- Chavira	1956 I = $4k$ Jan. 26-9612 B.3	57-3325 72-1852 79-6250	4-07392 1-0
787	P/Ashbrook- Jackson	1956 II = $5c$ Apr. 5-5718 p ($\Delta T = +0.60$)	349-0818 2-3022 12-4920	2-324410 0-393768 7-50776
788	Mrkos	1956 III = $6b$ Apr. 13-6092 E B.3	81-0109 226-0253 147-4560	0-842240 1-0
789	P/Olbers	1956 IV = $6a$ June 15-867 p ($\Delta T = +5.35$ $+3.32$)	64-6362 85-4153 44-6099	1-178530 0-930327 69-5692
790	P/Johnson	1956 V = $6f$ July 24-219 p ($\Delta T = +2.4$)	205-8998 118-1735 13-8602	2-258777 0-375060 6-87151
791	P/Crommelin	1956 VI = $6g$ Oct. 19-3698 p ($\Delta T = +5.86$)	196-0472 250-3651 28-8697	0-743220 0-919153 27-87260
792	P/Grigg- Skjellerup	1957 I = $6i$ Feb. 2-62893 B.4	356-2768 215-4329 17-6247	0-855313 0-703639 4-90293
793	P/Tempel (2)	1957 II = $6e$ Feb. 4-9492 p ($\Delta T = +0.05$)	191-0129 119-2780 12-4701	1-369473 0-547576 5-26638
794	Arend- Roland	1957 III = $6h$ Apr. 8-03117 A.3	308-7808 215-1591 119-9495	0-316062 1-000230 -0-0007268
795	P/Schwassmann- Wachmann (1)	1957 IV May 12-8910 E A.5	355-8271 321-6094 9-4872	5-53774 0-131488 16-10036
796	Mrkos	1957 V = $7d$ Aug. 1-43750 E A.5	40-3122 67-6249 93-9397	0-354924 0-999351 +0-0018297
797	Wirtanen	1957 VI = $6c$ Sept. 2-338 B.3	13-263 232-944 33-200	4-44611 1-00086 -0-0001934
798	P/Arend- Rigaux	1957 VII = $8b$ Sept. 8-29 p ($\Delta T = -1.5$)	326-405 124-648 17-200	1-38539 0-61070 6-71320

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
⊕ 799	P/Encke	1957 VIII = 7c Oct. 19·8454 _p ($\Delta T = -0.04$)	185°-2276 334·7290 12·3748	0·338123 0·847399 3·29818
800	Latyshev- Wild- Burnham	1957 IX = 7f Dec. 5·1293 B.1	277·623 210·186 156·721	0·53913 1·0
⊗ 801	P/Kopff	1958 I = 8d Jan. 20·077 _p (ΔT small)	161·7203 120·9975 4·7078	1·516199 0·556223 6·31520
⊕ 802	P/Reinmuth (1)	1958 II = 7e Mar. 25·0104 _p ($\Delta T = +0.8$)	12·9311 123·5562 8·3986	2·026247 0·478205 7·65225
⊗ 803	Burnham	1958 III = 8a Apr. 16·30885 A.5	16·4598 150·5106 15·7913	1·322577 0·999272 +0·0005504
804	P/Oterma	1958 IV June 10·5045 <i>E</i> A.5	354·8723 155·1100 3·9921	3·387830 0·144497 7·880436
805	Wulf P/Harrington	1958 V = 7g Aug. 11·8304 _p (ΔT small)	187·0288 254·2266 18·4790	1·604438 0·539881 6·51148
806	P/Slaughter- Burnham	1958 VI = 9a Sept. 5·36629 A.2	44·4252 346·2406 8·1652	2·544598 0·504445 11·63566
807	Burnham- Slaughter	1959 I = 8e Mar. 11·52737 <i>E</i> C.3	100·7341 323·0806 61·2588	1·628380 1·0
808	P/Wolf	1959 II = 8c Mar. 21·8244 _p (ΔT small)	161·0780 203·9045 27·2975	2·506895 0·394754 8·42959
⊕ 809	Bester- Hoffmeister	1959 III = 9d July 17·5686 C.3	186·4912 105·0689 12·8175	1·250122 1·0
⊗ 810	Alcock	1959 IV = 9e Aug. 17·59382 <i>E</i> C.3	124·6963 159·2326 48·2559	1·150237 1·0
811	P/Arend 750. c 490.	1959 V = 9c Sept. 1·6679 _p ($\Delta T = -0.5$)	44·5378 357·6158 21·6540	1·831746 0·533958 7·79219
812	Alcock	1959 VI = 9f Sept. 15·88116 <i>E</i> C.1	300·6002 225·1081 107·9074	0·165597 1·0

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
813	Burnham	1959 <u>VII</u> = 0a Sept. 27-7275 E B.2	273-2409 83-0833 69-5008	1-170751 1-0
814	P/Giacobini-Zinner	1959 <u>VIII</u> = 9b Oct. 26-91818 B.4	172-8433 196-0299 30-9041	0-935952 0-728934 6-416096
815	Mrkos	1959 <u>IX</u> = 9j Nov. 13-2154 E B.3	84-6614 99-9488 19-6344	1-253416 1-0
816	Humason	1959 <u>X</u> = 0e Dec. 12-54398 E B.3	46-7718 306-6347 125-4774	4-274397 1-0
817	P/Wild	1960 <u>I</u> = 0b Mar. 17-3816 E B.3	166-7459 359-0163 19-6897	1-927118 0-654756 13-18780
818	Burnham	1960 <u>II</u> = 9k Mar. 20-9945 E B.1	306-6692 251-9620 159-6006	0-504192 1-0
819	P/Schaumasse	1960 <u>III</u> = 9h Apr. 17-434p ($\Delta T = +0.6$)	51-9509 86-2407 12-0178	1-195952 0-705395 8-179208
820	P/Väisälä (1)	1960 <u>IV</u> = 9i May 10-849p ($\Delta T = 0$)	44-4458 135-4298 11-2905	1-741458 0-635817 10-4566
821	P/Borrelly	1960 <u>V</u> = 0k June 12-5582p ($\Delta T = -0.4$)	350-7521 76-2312 31-0894	1-452474 0-603854 7-02069
822	P/Brooks (2)	1960 <u>VI</u> = 0h June 17-3132p (ΔT small)	197-1018 176-8906 5-5713	1-763116 0-504884 6-719865
823	P/Harrington (2)	1960 <u>VII</u> = 0g June 28-354pE ($\Delta T = -0.2$)	232-7977 119-1646 8-6842	1-582423 0-559229 6-80243
824	P/Finlay	1960 <u>VIII</u> = 0d Sept. 1-10085 E B.4	321-6120 42-0583 3-6446	1-077209 0-702663 6-895667
825	P/Reinmuth (2)	1960 <u>IX</u> = 0c Nov. 24-8518pE (ΔT small)	45-4855 296-1772 6-9909	1-932544 0-456850 6-71142
826	P/Encke	1961 <u>I</u> = 0i Feb. 5-583p (ΔT small)	185-2271 334-7214 12-3597	0-339017 0-847056 3-300152

COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
(X) 827	Candy	1961 =0n Feb. 8-58392 <i>E</i> B.3	^o 136-2574 176-5673 150-9277	1-064039 1-0
(X) 828	P/Comas Solá	1961 =0f Apr. 4-4931 <i>pE</i> (ΔT small)	40-0191 62-8448 13-4411	1-777190 0-576145 8-58568
(X) 829	P/Wirtanen	1961 =0m Apr. 15-29961 <i>pE</i> (ΔT small)	343-5027 86-4675 13-3895	1-618047 0-543330 6-669342
(X) 832	P/Schwassmann- Wachmann (2)	1961 =0j Sept. 5-47079 <i>pE</i> ($\Delta T = +0.3$)	357-7413 126-0055 3-7236	2-15688 0-382774 6-53240
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COMET CATALOGUE

No.	Name	Designation Perihelion passage Classification	ω Ω i	q e P (or $1/a$)
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NOTES AND REFERENCES

References which have not been examined are enclosed in (square) brackets, thus: [*American Almanac*, 1847]. Many of the early computers failed to quote an equinox; in these cases the assumed equinox is indicated similarly by means of brackets, thus: [Eq. 1882.0]. The customary abbreviations are used; those most commonly occurring are as follows:

<i>A.N.</i>	<i>Astronomische Nachrichten</i>
<i>Abh.</i>	Abhandlung
<i>A.J.</i>	<i>Astronomical Journal</i>
<i>Ann.</i>	Annals
<i>Astr. Circ.</i>	Astronomical Circulars
<i>B.</i>	F. Baldet, <i>Catalogue Général des Orbites de Comètes</i> (Paris, 1952)
<i>B.A.N.</i>	<i>Bulletin of the Astronomical Institutes of the Netherlands</i>
<i>B.J.</i>	<i>Berliner Astronomisches Jahrbuch</i>
<i>Bull.</i>	Bulletin
<i>B.Z.</i>	<i>Beobachtungs-Zirkular der Astronomischen Nachrichten</i>
<i>C.</i>	A. C. D. Crommelin's continuation of Galle's Catalogue, <i>Memoirs B.A.A.</i> , 26, part 2, and 30, part 1
<i>C. de T.</i>	<i>Connaissance des Temps</i>
<i>Contr.</i>	Contributions
<i>C.R.</i>	<i>Comptes Rendus de l'Académie des Sciences</i> (Paris)
<i>Denk.</i>	Denkschrift
<i>G.</i>	Galle's <i>Cometenbahnen</i> . . . , 1894
<i>H.A.C.</i>	<i>Harvard Announcement Cards</i>
<i>J.B.A.A.</i>	<i>Journal of the British Astronomical Association</i>
<i>J. des Obs.</i>	<i>Journal des Observateurs</i> (Marseille)
<i>L.O.B.</i>	<i>Lick Observatory Bulletin</i>
<i>M.N.</i>	<i>Monthly Notices of the Royal Astronomical Society</i>
<i>Mem.</i>	Memoirs
<i>Mon. Corr.</i>	<i>Monatliche Correspondenz für Erd und Himmelskunde</i>
<i>MS</i>	Manuscript
<i>N.A.Z.</i>	<i>Nachrichtenblatt der Astronomischen Zentralstelle</i> (Heidelberg)
<i>Obs.</i>	Observatory
<i>Pingré</i>	Pingré's <i>Cometographie</i> . . . , Vols. I (1783) and II (1784)
<i>Pub.</i>	Publications
<i>Q.J.R.A.S.</i>	<i>Quarterly Journal of the Royal Astronomical Society</i>
<i>Sitz.</i>	Sitzungsberichte
<i>Struyck</i>	N. Struyck, <i>Inleiding tot de algemeene geographie</i> (Amsterdam, 1740); <i>Vervolg van de Beschryving der Staatsterren</i> (Amsterdam, 1753)
<i>Tab. Astron.</i>	Halley's <i>Tabulae Astronomicae</i> . . . (London, 1749)
<i>Tr.</i>	<i>Trudy</i> (in Russian publications)
<i>Trans.</i>	Transactions
<i>U.A.I.C.</i>	<i>Circulars of the International Astronomical Union</i>
<i>V.J.S.</i>	<i>Vierteljahrsschrift der Astronomischen Gesellschaft</i>

NOTES AND REFERENCES

- 1 P/Halley, -239. P. H. Cowell and A. C. D. Crommelin, *M.N.*, **68**, 668.
- 2 P/Halley, -162. Cowell and Crommelin, *ibid.*
- 3 Roman Comet, -136. — Peirce [*American Almanac*, 1847].
- 4 P/Halley, -86. Cowell and Crommelin, *loc. cit.*
- 5 Chinese Comet, -68. — Peirce [*American Almanac*, 1847].
- 6 P/Halley, -11. Cowell and Crommelin, *loc. cit.*
- 7 P/Halley, 66. J. Holetschek, *A.N.*, **143**, 113; and Cowell and Crommelin, *loc. cit.*
- 8 P/Halley, 141. Cowell and Crommelin, *loc. cit.*
- 9 P/Halley, 218. Cowell and Crommelin, *loc. cit.*
- 10 Chinese Comet, 240. J. C. Burckhardt, *Mon. Corr.*, **10**, 167. "Very uncertain path."
[Eq. 241-0].
- 11 P/Halley, 295. Cowell and Crommelin, *loc. cit.*
- 12 P/Halley, 374. Cowell and Crommelin, *loc. cit.*; and K. Hirayama, *Obs.*, **34**, 199.
- 13 P/Halley, 451. Cowell and Crommelin, *M.N.*, **68**, 112 and 668.
- 14 P/Halley, 530. Cowell and Crommelin, *ibid.*
- 15 Chinese Comet, 565. J. C. Burckhardt, *Mon. Corr.*, **10**, 163. [Eq. 565-0].
- 16 Chinese Comet, 568. E. Laugier, *C.R.*, **22**, 156. [Eq. 569-0].
- 17 Chinese Comet, 574. J. R. Hind, *A.N.*, **21**, 279; **23**, 377. Very uncertain elements.
[Eq. 574-0].
- 18 P/Halley, 607. Cowell and Crommelin, *loc. cit.*
- 19 P/Halley, 684. Cowell and Crommelin, *loc. cit.*
- 20 P/Halley, 760. Cowell and Crommelin, *M.N.*, **68**, 112 and 513.
- 21 Chinese Comet, 770. J. R. Hind, *A.N.*, **23**, 377. Uncertain elements.
- 22 P/Halley, 837. Cowell and Crommelin, *M.N.*, **68**, 513.
- 23 Bright Comet, 868. S. Kanda, *Japanese J. Astr.*, **10**, Abstr. (30), No. 106.
- 24 P/Halley, 912. Cowell and Crommelin, *ibid.*
- 25 Chinese Comet, 961. G. Ravené, *Obs.*, **20**, 129.
- 26 P/Halley, 989. J. Holetschek, *A.N.*, **143**, 115; and Cowell and Crommelin, *loc. cit.*
- 27 Bright Comet, 1006. *Pingré I*, 364. [Eq. 1006-0].
- 28 P/Halley, 1066. Cowell and Crommelin, *M.N.*, **68**, 378.
- 29 Chinese Comet, 1092. J. R. Hind, *A.N.*, **27**, 157; *C.R.*, **26**, 341.
- 30 Bright Comet, 1097. J. C. Burckhardt, *Mon. Corr.*, **16**, 501. [Eq. 1098-0].
- 31 Bright Comet, 1132. S. Ogura, *Ann. Tokyo Obs.*, **5**.
- 32 P/Halley, 1145. Cowell and Crommelin, *M.N.*, **68**, 377.
- 33 P/Halley, 1222. Cowell and Crommelin, *ibid.*
- 34 Chinese Comet, 1231. *Pingré I*, 402. [Eq. 1231-0].
- 35 Bright Comet, 1240. S. Ogura, *Ann. Tokyo Obs.*, **5**.
- 36 Brilliant Comet, 1264. M. Hoek, [*Dissert. inaug. Leiden*, 1857]. The orbit given here
is from G.
- 37 Bright Comet, 1299. *Pingré I*, 419. [Eq. 1299-0].
- 38 P/Halley, 1301. Cowell and Crommelin, *M.N.*, **68**, 125.
- 39 Brilliant Comet, 1337. E. Laugier, *C.R.*, **22**, 153. [Eq. 1337-0].
- 40 Bright Comet, 1362. J. C. Burckhardt, *Mon. Corr.*, **10**, 166. [Eq. 1362-0].
- 41 P/Tempel-Tuttle (?), 1366. S. Kanda, *Japanese J. Astr.*, **10**, Abstr. (30), No. 106.
- 42 P/Halley, 1378. E. Laugier, *C.R.*, **16**, 1005; Cowell and Crommelin, *M.N.*, **68**, 125.
- 43 Chinese Comet, 1385. J. R. Hind, *A.N.*, **21**, 279; **23**, 377.
- 44 Brilliant Comet, 1402. J. R. Hind, (?), *Nature*, **16**, 50. [Eq. 1402-0].
- 45 Bright Comet, 1433. G. Celoria, *A.N.*, **109**, 110.
- 46 Bright Comet, 1449. G. Celoria, *A.N.*, **109**, 269.
- 47 P/Halley, 1456. G. Celoria, *A.N.*, **111**, 70.
- 48 P/Crommelin, 1457 I. A. C. D. Crommelin, *M.N.*, **92**, 451.
- 49 Toscanelli, 1457 II. G. Celoria, *A.N.*, **110**, 173.
- 50 Bright Comet, 1468. B. Valz, *C.R.*, **22**, 425. [Eq. 1469-0].
- 51 Regiomontanus, 1472. G. Celoria, *A.N.*, **112**, 53.
- 52 Bright Comet, 1490. J. R. Hind, *A.N.*, **23**, 377.
- 53 Chinese Comet, 1499. J. R. Hind, [*Bull. Obs. Paris*, 1861 Aug. 9].
- 54 Bright Comet, 1500. J. R. Hind, [*ibid.*].
- 55 Bright Comet, 1506. E. Laugier, *C.R.*, **22**, 154. [Eq. 1506-0].
- 56 P/Halley, 1531. Halley, *Tab. Astron.* [Eq. 1531-0].
- 57 Fracastor, 1532. W. Olbers, [*Hindenburg's Mag.*, 1787, 440]. [Eq. 1533-0].
- 58 Apian, 1533. W. Olbers, *B.J.*, 1800, 126. [Eq. 1533-0].
- 59 Fabricius, 1556. M. Hoek, *A.N.*, **55**, 216.
- 60 Hesse-Gemma, 1558. M. Hoek, *A.N.*, **68**, 96.
- 61 Brahe, 1577. F. Woldstedt, *A.N.*, **24**, 7.
- 62 Moestlin, 1580. H. C. F. C. Schjellerup, *A.N.*, **42**, 173.
- 63 Brahe, 1582. A. Marth, *Nature*, **19**, 123.
- 64 Hesse-Rothman, 1585. C. A. F. Peters, *A.N.*, **29**, 269.
- 65 Brahe, 1590. J. R. Hind, *A.N.*, **25**, 131.

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- 66 Ripensis, 1593. N. L. de Lacaille, *Mem. Ac. Paris*, 1747, 562. [Eq. 1593-5].
 67 Brahe-Moestlin, 1596. J. R. Hind, *A.N.*, 23, 232.
 68 P/Halley, 1607. F. W. Bessel, *Mon. Corr.*, 10, 438. [Eq. 1608-0].
 69 Kepler, 1618 I. *Pingré II*, 4, 100. [Eq. 1619-0].
 70 Brilliant Comet, 1618 II. W. Bessel, *B.J.*, 1808, 119.
 71 P/Crommelin, 1625. A. C. D. Crommelin, *J.B.A.A.*, 44, 240.
 72 Hevelius, 1652. Halley, *Tab. Astron.* [Eq. 1653-0].
 73 Hevelius, 1661. P. F. A. Méchain, *Mem. prés. Paris*, 1785, 395. [Eq. 1661-0].
 74 Hevelius, 1664. L. L. Lindelöf, *Dissert. inaug. Helsingfors*, 1854.
 75 Hevelius, 1665. Halley, *Tab. Astron.* [Eq. 1665-0].
 76 Gottignies, 1668. H. Kreutz, *Astr. Abh.*, 1 (1), 66.
 77 Hevelius, 1672. A. Berberich, *A.N.*, 118, 70.
 78 Hevelius, 1677. Halley, *Tab. Astron.* [Eq. 1677-0].
 79 P/de Vice-Swift, 1678. U. J. J. Le Verrier, *A.N.*, 26, 383. [Eq. of epoch].
 80 Kirch, 1680. J. F. Encke, *Zeitsch. f. Astr.*, 6, 157.
 81 P/Halley, 1682. O. A. Rosenberger, *A.N.*, 12, 190.
 82 Flamsteed, 1683. W. E. Plummer, *M.N.*, 30, 157.
 83 Bianchini, 1684. P. Neugebauer, *A.N.*, 84, 144. [Eq. 1684-5].
 84 Bright Comet, 1686. J. R. Hind, *Nature*, 14, 257.
 85 Richaud, 1689. J. Holetschek, *A.N.*, 129, 325.
 86 Jacob, 1695. H. Kreutz, *Astr. Abh.*, 1 (1), 80. [Eq. 1696-0].
 87 La Hire-Cassini, 1698. J. R. Hind, *Nature*, 14, 152.
 88 de Fontenay, 1699. J. R. Hind, *Nature*, 20, 482. [Eq. 1699-0].
 89 Pallu, 1701. J. C. Burckhardt, *C. de T.*, 1811, 485. Stated to be very rough. [Eq. 1702-0].
 90 La Hire-Maraldi-Bianchini, 1702. J. C. Burckhardt, *Mon. Corr.*, 16, 511. [Eq. 1702-0].
 91 Cassini-Maraldi, 1706. *Struyck*, 1753, 53. [Eq. 1706-0].
 92 Manfredi-Stancari, 1707. *Struyck*, 1753, 54. [Eq. 1708-0].
 93 Kirch, 1718. F. Argelander (?), *A.N.*, 7, 495.
 94 Sanderson, 1723. — Spoerer, [*Dissert. inaug. Berol.*, 1843]. No details in G. [Eq. 1724-0].
 95 Sarabat, 1729. J. R. Hind, *Nature*, 30, 519.
 96 Bradley, 1737 I. J. Bradley, *Phil. Trans.*, 40, 116. [Eq. 1737-0].
 97 Kegler, 1737 II. J. R. Hind, [*Bull. Obs. Paris*, 1874, Sept. 17]. [Eq. 1737-5].
 98 Zanotti, 1739. N. L. de Lacaille, *Leçons d'Astron.* [Eq. 1739-5].
 99 P/Grigg-Mellish, 1742. E. Weiss, *Denk. Wiener Akad.*, 84, 12.
 100 P/Grischow, 1743 I. Th. Clausen, *A.N.*, 10, 345.
 101 Klinkenberg-Struyck, 1743 II. H. d'Arrest, *A.N.*, 37, 363.
 102 Klinkenberg, 1744. W. E. Plummer, *M.N.*, 34, 85.
 103 Kindermann, 1746. J. Holetschek, *A.N.*, 143, 120. [Eq. 1746-0].
 104 Chéseaux, 1747. N. L. de Lacaille, *Leçons d'Astron.* [Eq. 1747-0].
 105 Maraldi, 1748 I. Le Monnier, in *Struyck*, 1753, 95; and *Pingré II*, 104. Pingré attributes this orbit to Lacaille. [Eq. 1748-0].
 106 Klinkenberg, 1748 II. W. Bessel, *B.J.*, 1809, 99. [Eq. 1748-5].
 107 Bradley-Klinkenberg, 1757. C. Wirtz, *A.N.*, 201, 109.
 108 de la Nux, 1758. *Pingré II*, 104. [Eq. 1758-5].
 109 P/Halley, 1759 I. O. A. Rosenberger, *A.N.*, 12, 190.
 110 Messier, 1759 II. *Pingré II*, 104. [Eq. 1760-0].
 111 Parisian Comet, 1759 III. J. R. Hind, *Nature*, 20, 226.
 112 Klinkenberg, 1762. J. C. Burckhardt, *Mem. Inst. Nat. France*, 7, 1806, 228. [Eq. 1762-0].
 113 Messier, 1763. J. C. Burckhardt, *Mon. Corr.*, 10, 511. An elliptical orbit also given. [Eq. 1764-0].
 114 Messier, 1764. P. Pingré, *Mem. Ac. Paris*, 1771, 513. [Eq. 1764-0].
 115 Messier, 1766 I. *Pingré II*, 106. [Eq. 1766-0].
 116 P/Helfenzrieder, 1766 II. C. Wirtz, *A.N.*, 201, 79. This orbit, based on three normals, seems more likely than another, with shorter period, giving large residuals with two out of four normals.
 117 Messier, 1769. W. Bessel, *B.J.*, 1810, 123; 1811, 197.
 118 P/Lexell, 1770 I. U. J. J. Le Verrier, *C.R.*, 26, 468.
 119 de la Nux, 1770 II. *Pingré II*, 106. [Eq. 1771-0].
 120 Messier, 1771. H. Kreutz, *A.N.*, 103, 336. See also *C.R.*, 120, 980.
 121 P/Biela, 1772. J. S. Hubbard, *A.J.*, 6, 114.
 122 Messier, 1773. J. C. Burckhardt, *Mon. Corr.*, 10, 512. [Eq. 1774-0].
 123 Montaigne, 1774. J. C. Burckhardt, *C. de T.*, 1821, 295. The eccentricity is omitted in G. [Eq. 1775-0].
 124 Bode-Messier, 1779. H. Büttner, *Astr. Abh.*, 4, No. 4.
 125 Messier, 1780 I. E. Clüver, *A.N.*, 6, 147.

NOTES AND REFERENCES

- 126 Montaigne-Olbers, 1780 II. W. Olbers, *A.N.*, 143, 120; and *B.J.*, 1804, 179.
- 127 Méchain, 1781 I. P. F. A. Méchain, *Mem. Acad. Paris*, 1782, 583. [Eq. 1781-5].
- 128 Méchain, 1781 II. P. F. A. Méchain, *Mem. Acad. Paris*, 1780, 71. [Eq. 1782-0].
- 129 P/Pigott, 1783. C. H. F. Peters, *Brünnow's Astr. Not.*, No. 19, 1860.
- 130 de la Nux, 1784. P. F. A. Méchain, *Mem. Acad. Paris*, 1784, 363. [Eq. 1784-0].
- 131 Messier-Méchain, 1785 I. P. F. A. Méchain, *B.J.*, 1788, 166. [Eq. 1785-0].
- 132 Méchain, 1785 II. A. Krueger, *Acta Soc. Fenn.*, 9, I, 367.
- 133 P/Encke, 1786 I. J. F. Encke, *B.J.*, 1822, 196. [Eq. 1786-0].
- 134 Herschel, 1786 II. M. Palmer, *A.J.*, 31, 189. Parabola and other ellipses also given.
- 135 Méchain, 1787. B. de Saron (?), *B.J.*, 1791, 155. [Eq. 1787-0].
- 136 Méchain, 1788 I. P. F. A. Méchain, *B.J.*, 1793, 118. [Eq. 1789-0]. *MISSI EN*
- 137 P/Herschel-Rigollet, 1788 II. M. Palmer, *A.J.*, 34, 84. Poor observations; the comet returned in 1939—see No. 654.
- 138 Herschel, 1790 I. B. de Saron, *Mem. Acad. Paris*, 1790, 312. [Eq. 1790-0].
- 139 P/Tuttle, 1790 II. F. C. A. Tischler, *V.J.S.*, 6, 91.
- 140 Herschel, 1790 III. P. F. A. Méchain, *Mem. Acad. Paris*, 1790, 336 [Eq. 1790-0].
- 141 Herschel, 1792 I. P. F. A. Méchain, *C. de T.*, 1793, 374. [Eq. 1792-0].
- 142 Gregory-Méchain, 1792 II. — Prosperin, *B.J.*, 1799, 192. [Eq. 1793-0].
- 143 Messier, 1793 I. B. de Saron, *A.N.*, 172, 204. [Eq. 1794-0].
- 144 Perny, 1793 II. C. H. F. Peters, *Brünnow's Astr. Not.*, No. 19, 1860.
- 145 P/Encke, 1795. J. F. Encke, *B.J.*, 1822, 186.
- 146 Olbers, 1796. H. A. Peck, *A.J.*, 25, 161.
- 147 Bouvard-Herschel-Lee, 1797. W. Olbers, *Allgem. geog. Ephem.*, 1, 128, 366. [Eq. 1797-0].
- 148 Messier, 1798 I. J. R. Hind, *Nature*, 29, 135.
- 149 Bouvard-Olbers, 1798 II. J. C. Burckhardt, *Allgem. geog. Ephem.*, 3, 398. [Eq. 1799-0]. Designated as 1798 II, since dates were recorded in G.M.A.T.
- 150 Méchain, 1799 I. — Tallquist, [*Dissert. inaug. Aboae*, 1825]—no details available in G. [Eq. 1799-0].
- 151 Méchain, 1799 II. P. F. A. Méchain, *C. de T.*, An. XII (1804), 376. [Eq. 1800-0].
- 152 Reissig-Pons-Messier, 1801. A. N. Doberck, *A.N.*, 81, 324.
- 153 Pons-Méchain-Olbers, 1802. K. Lundmark, *K. Svenska Vet.*, 12, No. 13, 1917. *T* is correct in C. but not in B.
- 154 Pons-Bouvard-Olbers, 1804. C. F. Gauss, *B.J.*, 1807, 232. [Eq. 1804-0].
- 155 P/Encke, 1805. J. F. Encke, *B.J.*, 1822, 190.
- 156 P/Biela, 1806 I. J. V. Hepperger, *Sitz. Akad. Wien*, 109 (2a), 648. C. and B. appear to have corrected for Berlin instead of Paris time.
- 157 Pons, 1806 II. F. Hensel, *A.N.*, 58, 92. Uncertain observations; a parabolic orbit would probably be satisfactory.
- 158 Giovanni, 1807. W. Bessel, *B.J.*, 1813, 188. *PARISI*
- 159 Pons-Wisniewsky, 1808 I. J. F. Encke, *A.N.*, 5, 7.
- 160 Pons, 1808 II. W. Bessel, *Mon. Corr.*, 18, 359. [Eq. 1808-0].
- 161 Pons, 1810. A. Thraen, *A.N.*, 99, 347.
- 162 Flaugergues, 1811 I. N. Herz, *Pub. Kuffner Obs.*, 2, 241.
- 163 Pons, 1811 II. A. Nekrassow, *A.N.*, 182, 65.
- 164 P/Pons-Brooks, 1812. L. Schulhof and J. Bossert, *A.N.*, 103, 291.
- 165 Pons, 1813 I. H. A. Peck, *A.J.*, 26, 7.
- 166 Pons-Harding, 1813 II. L. Gerling, *Mon. Corr.*, 28, 502. [Eq. 1813-0].
- 167 P/Olbers, 1815. H. Q. Rasmusen, *Pub. Copenhagen Obs.*, 147.
- 168 Pons, 1816. J. C. Burckhardt, *A.N.*, 34, 378. [Eq. 1816-0].
- 169 P/Crommelin, 1818 I. A. C. D. Crommelin, *M.N.*, 90, 322, with corrections from *Memoirs B.A.A.*, 30, part 1.
- 170 Pons, 1818 II. J. Mrazek, *A.N.*, 232, 177.
- 171 Pons, 1818 III. O. A. Rosenberger and — Schercke, *B.J.*, 1824, 144. Hyperbolic orbit also given. [Eq. 1818-0].
- 172 P/Encke, 1819 I. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 173 Tralles, 1819 II. H. A. Peck, *A.J.*, 25, 72 and 137.
- 174 P/Pons-Winnecke, 1819 III. J. F. Encke, *Corr. Astr.*, 3, 293, and *B.J.*, 1823, 222.
- 175 P/Blanpain, 1819 IV. I. Lagarde, *C.R.*, 144, 182.
- 176 Nicolle-Pons, 1821. O. A. Rosenberger, *A.N.*, 1, 425. [Eq. 1821-0].
- 177 Gambart-Pons-Biela, 1822 I. J. N. Nicolle, *C. de T.*, 1826, 278. [Eq. 1822-0].
- 178 P/Encke, 1822 II. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 179 Pons, 1822 III. H. A. Peck, *A.J.*, 25, 165.
- 180 Pons-Gambart-Bouvard, 1822 IV. A. Stichtenoth, *A.N.*, 145, 383.
- 181 de Breaute-Pons, 1823. A. Hnatek, *A.N.*, 188, 365.
- 182 Rümker, 1824 I. W. Doberck, *A.N.*, 138, 330.
- 183 Scheithauer, 1824 II. J. F. Encke, *A.N.*, 4, 123.

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- 184 Gambart, 1825 I. P. Martin, *Inaug. Diss. Göttingen*, 1893. This orbit has been strongly criticized by Boegehold in *A.N.*, 157, 259. [Eq. 1825-0].
- 185 Pons-Harding, 1825 II. Th. Clausen, *A.N.*, 4, 327.
- 186 P/Encke, 1825 III. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 187 Pons-Biela-Dunlop, 1825 IV. J. S. Hubbard, *A.J.*, 6, 37.
- 188 P/Biela, 1826 I. J. S. Hubbard, *A.J.*, 6, 124.
- 189 Pons, 1826 II. E. B. Cowley and I. Whiteside, *Astr. Abh.*, 2, No. 13. An elliptical orbit also given.
- 190 Flaugergues, 1826 III. This comet has been shown to be identical with P/Biela, 1826 I; see W. Hassenstein, *A.N.*, 198, 449.
- 191 Pons-Gambart, 1826 IV. R. Klug, *Anzeig. Akad. Wien*, 1906, 350.
- 192 Pons-Clausen-Gambart, 1826 V. A. Hnatek, *A.N.*, 178, 337. An elliptical orbit also given.
- 193 Pons, 1827 I. E. Strömgren, *A.N.*, 160, 241.
- 194 P/Pons-Gambart, 1827 II. S. Ogura, *Ann. Tokyo Obs.*, 5, 3.
- 195 Pons, 1827 III. E. Clüver, *A.N.*, 7, 62. An elliptical orbit also given.
- 196 P/Encke, 1829. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 197 d'Abbadie, 1830 I. L. R. Schulze, *A.N.*, 82, 101.
- 198 Herapath, 1830 II. J. P. Wolfers, *A.N.*, 10, 68.
- 199 P/Encke, 1832 I. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 200 Gambart-Harding, 1832 II. L. R. Schulze, *A.N.*, 82, 110.
- 201 P/Biela, 1832 III. J. Baranowski, *A.N.*, 14, 177.
- 202 Dunlop, 1833. W. Hartwig, *A.N.*, 47, 44.
- 203 Gambart-Dunlop, 1834. L. Schulhof, *Bull. Astr.*, 6, 115, 1889.
- 204 von Boguslawski, 1835 I. G. Rechenberg, *A.N.*, 143, 11.
- 205 P/Encke, 1835 II. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 206 P/Halley, 1835 III. P. H. Cowell and A. C. D. Crommelin, *A.N.*, 185, 265.
- 207 P/Encke, 1838. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 190.
- 208 Galle, 1840 I. G. Rechenberg, *A.N.*, 131, 258.
- 209 Galle, 1840 II. J. Kowalczyk, *A.N.*, 87, 231.
- 210 Galle, 1840 III. J. Kowalczyk, *A.N.*, 81, 133.
- 211 Bremiker, 1840 IV. C. A. Schultz-Steinheil, *Abh. Schwedischen Ak.*, 23, No. 14.
- 212 P/Encke, 1842 I. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 213 Laugier, 1842 II. K. Schwarzschild, *A.N.*, 137, 177.
- 214 Brilliant Comet, 1843 I. H. Kreutz, *A.N.*, 139, 113.
- 215 Mauvais, 1843 II. W. C. Götz, *A.N.*, 23, 71.
- 216 P/Faye, 1843 III. A. Möller, *A.N.*, 79, 121; *V.J.S.*, 7, 96.
- 217 P/de Vico-Swift, 1844 I. F. Brünnow, *Brünnow's Astr. Not.*, No. 3, 19, 1859.
- 218 Mauvais-d'Arrest, 1844 II. F. E. Ross, *Astr. Abh.*, 2, No. 9.
- 219 Wilmot, 1844 III. G. P. Bond, *A.J.*, 1, 103.
- 220 d'Arrest, 1845 I. W. Doberck, *M.N.*, 35, 104; *A.N.*, 85, 208.
- 221 de Vico-Faye, 1845 II. A. Scheller, *A.N.*, 157, 316. An elliptical orbit also given.
- 222 Colla, 1845 III. H. Peck, *A.J.*, 24, 25. Peck states that a parabolic orbit is to be preferred.
- 223 P/Encke, 1845 IV. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 224 de Vico, 1846 I. — Jelinck, *C.R.*, 26, 281. Ellipse also given.
- 225 P/Biela, 1846 II. J. S. Hubbard, *A.J.*, 6, 131. The elements are those of the preceding component.
- 226 P/Brorsen, 1846 III. C. Bruhns, *A.N.*, 71, 39.
- 227 P/de Vico, 1846 IV. J. v. Hepperger, *Anz. Akad. Wien.*, 1887 (9), 98.
- 228 de Vico-Hind, 1846 V. H. Vogel, *A.N.*, 71, 102.
- 229 P/Petersen, 1846 VI. A. Berberich, *A.N.*, 117, 251.
- 230 Brorsen-Wichmann-de Vico, 1846 VII. A. Krause, *Pub. Astr. Gesel.*, No. 24.
- 231 de Vico, 1846 VIII. S. Oppenheim, *A.N.*, 125, 31; *Anz. Akad. Wien.*, 1890 (9), 82.
- 232 Hind, 1847 I. C. Hornstein, *V.J.S.*, 6, 118.
- 233 Colla, 1847 II. F. Engström, *Afr. Lunds Univ., Arsskr.*, 17, 1881. Hyperbola also given.
- 234 Mauvais-Bond, 1847 III. E. Gautier, *A.N.*, 36, 80.
- 235 Schweizer, 1847 IV. W. Schur, *A.N.*, 88, 218.
- 236 P/Brorsen-Metcalf, 1847 V. P. Duckert, *A.N.*, 215, 208.
- 237 Mitchell-de Vico, 1847 VI. M. Palmer, *Trans. Yale Obs.*, 1, 206.
- 238 Petersen, 1848 I. F. Bidschof, *A.N.*, 117, 248.
- 239 P/Encke, 1848 II. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 240 Petersen, 1849 I. A. C. Petersen and A. Sonntag, *A.N.*, 29, 320.
- 241 Goujon, 1849 II. G. Weyer, *A.N.*, 35, 212.
- 242 Schweizer-Bond, 1849 III. H. d'Arrest, *A.N.*, 30, 116.
- 243 Petersen, 1850 I. R. C. Carrington, *A.N.*, 37, 46.
- 244 Bond-Brorsen, 1850 II. G. Rechenberg, *A.N.*, 135, 401.

NOTES AND REFERENCES

- 245 P/Faye, 1851 I. A. Möller, *V.J.S.*, 7, 96.
- 246 P/d'Arrest, 1851 II. G. Leveau, *Ann. Obs. Paris*, 14, B21.
- 247 Brorsen, 1851 III. R. Spitaler, *Denk. Wiener Akad.*, 61, 345. An elliptical orbit also given.
- 248 Brorsen, 1851 IV. P. Andries, *A.N.*, 81, 57.
- 249 P/Encke, 1852 I. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 250 Chacornac-Petersen-Bond, 1852 II. E. von Asten, *A.N.*, 81, 43.
- 251 P/Biela, 1852 III. J. S. Hubbard, *A.J.*, 6, 140. The elements are those of the preceding component.
- 252 P/Westphal, 1852 IV. A. Hnatek, *A.N.*, 185, 345.
- 253 Secchi, 1853 I. B. Cohn, *Sitz. Akad. Wien*, 108, 83.
- 254 Schweizer, 1853 II. G. Rümker, *A.N.*, 45, 284.
- 255 Klinkerfues, 1853 III. H. Büttner, *A.N.*, 207, 179. The original orbit was shown to be elliptical.
- 256 Bruhns, 1853 IV. H. d'Arrest, *A.N.*, 38, 190.
- 257 van Arsdale-Klinkerfues, 1854 I. — Rzepecki, *A.N.*, 47, 178.
- 258 de Meçiaux, 1854 II. H. Oppenheim, *Dissert. Inaug. Göttingen*, 1870.
- 259 Klinkerfues-van Arsdale, 1854 III. W. R. v. Hillmayr, *Denk. Wiener Akad.*, 72, 475.
- 260 Klinkerfues, etc., 1854 IV. C. Buschbaum and L. Steiner, *A.N.*, 149, 343.
- 261 Colla-Winnecke-Dien, 1854 V. W. Elkin, *A. N.*, 94, 78.
- 262 Schweizer, 1855 I. B. Tiele, *A.N.*, 52, 38.
- 263 Donati-Dien-Klinkerfues, 1855 II. G. van Biesbroeck, *A.J.*, 29, 113.
- 264 P/Encke, 1855 III. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 265 Bruhns, 1855 IV. L. R. Schulze, *A.N.*, 44, 85.
- 266 d'Arrest, 1857 I. M. Löwy, *Sitz. Akad. Wien*, 35, 409; *A.N.*, 51, 61.
- 267 P/Brorsen, 1857 II. C. Bruhns, *A.N.*, 71, 40.
- 268 Klinkerfues, 1857 III. R. König, *A.N.*, 128, 391.
- 269 Peters-Dien-Habicht, 1857 IV. A. Möller, *A.N.*, 49, 363.
- 270 Klinkerfues, 1857 V. C. Linsser, *A.N.*, 52, 105.
- 271 Donati-van Arsdale, 1857 VI. A. Auwers, *A.N.*, 50, 119.
- 272 P/d'Arrest, 1857 VII. L. R. Schulze, *A.N.*, 65, 168.
- 273 P/Tuttle, 1858 I. J. Rahts, *A.N.*, 113, 194.
- 274 P/Pons-Winnecke, 1858 II. E. v. Haerdtl, *Denk. Wiener Akad.*, 56, 162. Two other osculating orbits also given.
- 275 P/Tuttle-Giacobini-Kresák, 1858 III. A. C. D. Crommelin, *M.N.*, 89, 362.
- 276 Bruhns, 1858 IV. A. Auwers, *A.N.*, 51, 124.
- 277 P/Faye, 1858 V. A. Möller, *V.J.S.*, 7, 96.
- 278 Donati, 1858 VI. G. W. Hill, *Mem. Amer. Acad. Sci.*, 9, 67.
- 279 Tuttle, 1858 VII. E. Weiss, *Sitz. Akad. Wien*, 33, 359.
- 280 P/Encke, 1858 VIII. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 105.
- 281 Tempel, 1859. O. Klein, *A.N.*, 188, 385.
- 282 Liais, 1860 I. C. F. Pechüle, *A.N.*, 72, 236. This comet was in two parts; the data are for comet A.
- 283 Rümker, 1860 II. H. Gylden, *Bull. Ac. St. Petersburg*, 6, 363.
- 284 Italian Comet, 1860 III. A. Auwers, *Abh. Berlin Akad.*, 1867, 25.
- 285 Tempel, 1860 IV. J. Kowalczyk, *A.N.*, 75, 165.
- 286 Thatcher, 1861 I. Th. Oppolzer, *A.N.*, 62, 187.
- 287 Tebbutt, 1861 II. H. Kreutz, *Dissert. Inaug. Bonn*, 1880, 146.
- 288 Tuttle-Winnecke, 1861 III. M. Noether, *A.N.*, 69, 106.
- 289 P/Encke, 1862 I. E. von Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 106.
- 290 Schmidt-Tempel, 1862 II. V. Cerulli, *A.N.*, 118, 203.
- 291 P/Swift-Tuttle, 1862 III. F. Hayn, *Dissert. Inaug. Göttingen*, 1889.
- 292 Respighi-Bruhns, 1862 IV. — Krahll, *A.N.*, 65, 61.
- 293 Bruhns, 1863 I. A. von Flotow, *A.N.*, 160, 237. Hyperbola also given.
- 294 Klinkerfues-Donati, 1863 II. J. Frischauf, *A.N.*, 62, 343.
- 295 Respighi, 1863 III. G. Ericsson, *A.N.*, 118, 358.
- 296 Tempel-Schmidt, 1863 IV. A. Svedstrup, *A.N.*, 117, 242.
- 297 Respighi, 1863 V. W. Valentiner, *Diss. Inaug. Berlin*, 1869.
- 298 Baeker-Tempel, 1863 VI. P. G. Rosen, *A.N.*, 68, 159.
- 299 Donati, 1864 I. J. Kowalczyk, *A.N.*, 73, 84.
- 300 Tempel-Respighi, 1864 II. J. Kowalczyk, *A.N.*, 75, 164.
- 301 Donati-Toussaint, 1864 III. J. F. Schroeter, *Vid.-Selsk. Skrift.*, 1905, I, 32.
- 302 Baeker-Chacornac, 1864 IV. J. Kowalczyk, *A.N.*, 73, 90.
- 303 Bruhns, 1864 V. F. Wesely, *Denk. Wiener Akad.*, 84, 641. Hyperbola also given.
- 304 Abbott, 1865 I. F. Koerber, *Dissert. Inaug. Breslau*, 1887.
- 305 P/Encke, 1865 II. E. v. Asten, *Mem. Ac. St. Petersburg*, VII, 26 (2), 106.
- 306 P/Tempel-Tuttle, 1866 I. T. Oppolzer, *A.N.*, 68, 249.
- 307 P/Faye, 1866 II. A. Möller, *V.J.S.*, 7, 97.

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- 308 P/Stephan-Oterma, 1867 I. L. Becker, *M.N.*, **51**, 489.
 309 P/Tempel (1), 1867 II. R. Gautier, *Mem. Ac. Genève*, **29**, No. 12.
 310 Baeker-Winnecke, 1867 III. P. Broch, *A.N.*, **121**, 356.
 311 P/Brorsen, 1868 I. L. R. Schulze, *A.N.*, **93**, 183.
 312 Winnecke, 1868 II. F. Karlinski, *Annales Bur. Long.*, 1885, 214.
 313 P/Encke, 1868 III. E. v. Asten, *Mem. Ac. St. Petersburg*, VII, **26** (2), 106.
 314 P/Pons-Winnecke, 1869 I. E. v. Haerdtl, *Denk. Wiener Akad.*, **56**, 162.
 315 Tempel, 1869 II. J. Kowalczyk, *A.N.*, **81**, 143.
 316 P/Tempel-Swift, 1869 III. E. Maubant, *Ann. Obs. Paris*, **30**, D 58.
 317 Tempel-Winnecke, 1870 I. A. Seydler, *Sitz. Akad. Wien.*, **64**, 147.
 318 Coggia, 1870 II. A. Schobloch, *A.N.*, **141**, 402. The orbit is parabolic; error in C., where the comet is given the period of No. 324, 1871 IV.
 319 P/d'Arrest, 1870 III. G. Leveau, *A.N.*, **105**, 21.
 320 Winnecke, 1870 IV. L. Schulhof, *A.N.*, **85**, 323.
 321 Winnecke-Borrelly-Swift, 1871 I. J. Holetschek, *A.N.*, **82**, 301; **84**, 330.
 322 Tempel, 1871 II. N. Cramer, *Dissert. Inaug. Leiden*, 1875.
 323 P/Tuttle, 1871 III. J. Rahts, *A.N.*, **136**, 65.
 324 Tempel, 1871 IV. I. Lagarde, *Bull. Astr.*, **15**, 129, 1898. The orbit is elliptical; error in C., where the period of this comet has been given to No. 318, 1870 II.
 325 P/Encke, 1871 V. O. Backlund, *Mem. Ac. St. Petersburg*, VII, **34** (8), 38.
 326 Pogson, 1872. H. Kreutz, *Astr. Jahresh.*, **3**, 190; *Astr. Abh.*, **1** (1), 62. Seen only two days.
 327 P/Tempel (1), 1873 I. R. Gautier, *Mem. Ac. Genève*, **29**, No. 12.
 328 P/Tempel (2), 1873 II. L. Schulhof, *Annales Bur. Long.*, 1884, 229.
 329 P/Faye, 1873 III. A. Möller, *A.N.*, **80**, 337.
 330 Borrelly, 1873 IV. R. Gautier, *A.N.*, **92**, 72.
 331 Henry, 1873 V. H. Kreutz, *Pub. Kiel Obs.*, **9**, No. 2.
 332 P/Brorsen, 1873 VI. E. Lamp, *Pub. Kiel Obs.*, **7**, 56.
 333 P/Crommelin, 1873 VII. A. C. D. Crommelin, *M.N.*, **90**, 322, with corrections, *Mem. B.A.A.*, **30**, part I, 4.
 334 Winnecke, 1874 I. A. Wittstein, *A.N.*, **94**, 200.
 335 Winnecke-Borrelly-Tempel, 1874 II. G. Burggraf, *Sitz. Akad. Wien*, **113** (2a), 97.
 336 Coggia, 1874 III. J. v. Hepperger, *Sitz. Akad. Wien*, **86** (2), 502.
 337 Coggia, 1874 IV. J. Holetschek, *Sitz. Akad. Wien*, **86**, 1098.
 338 Borrelly, 1874 V. G. Gruss, *Sitz. Akad. Wien*, **78**, 276. Erroneous reference in G.
 339 Borrelly, 1874 VI. J. Holetschek, *A.N.*, **94**, 190.
 340 P/Pons-Winnecke, 1875 I. E. von Haerdtl, *Denk. Wiener Akad.*, **56**, 162.
 341 P/Encke, 1875 II. O. Backlund, *Mem. Ac. St. Petersburg*, VII, **34** (8), 38.
 342 Borrelly-Pechüle, 1877 I. A. Thraen, *A.N.*, **100**, 238.
 343 Winnecke-Block, 1877 II. C. W. Plath, *A.N.*, **93**, 45; and pamphlet, privately printed.
 344 Swift-Borrelly-Block, 1877 III. R. Poenisch, *A.N.*, **115**, 187.
 345 P/d'Arrest, 1877 IV. G. Leveau, *A.N.*, **105**, 22; *C.R.*, **96**, 4.
 346 Tempel, 1877 V. G. Gruss, *Sitz. Akad. Wien*, **85**, 98.
 347 Coggia, 1877 VI. R. Larssen, *A.N.*, **116**, 25.
 348 Swift, 1878 I. H. Büttner, *A.N.*, **97**, 278.
 349 P/Encke, 1878 II. O. Backlund, *Mem. Ac. St. Petersburg*, VII, **34** (8), 38.
 350 P/Tempel (2), 1878 III. L. Schulhof, *Annales Bur. Long.*, 1884, 229.
 351 P/Brorsen, 1879 I. E. Lamp, *Pub. Kiel Obs.*, **7**, 56.
 352 Swift, 1879 II. V. Kremser, *A.N.*, **108**, 102.
 353 P/Tempel (1), 1879 III. R. Gautier, *Mem. Ac. Genève*, **29**, No. 12.
 354 Hartwig, 1879 IV. E. Millosevich, *Mem. Spettr. Ital.*, **17**, 55.
 355 Palisa, 1879 V. Kurt Laves, *A.J.*, **16**, 9.
 356 Gould, 1880 I. H. Kreutz, *V.J.S.*, **36**, 235.
 357 Schaeberle, 1880 II. J. Polak, *A.N.*, **193**, 393. Parabola preferred.
 358 Hartwig-Harrington, 1880 III. T. Molien, *A.B.*, **105**, 362; **106**, 121.
 359 P/Tempel-Swift, 1880 IV. E. Maubant, *Ann. Obs. Paris*, **30**, D 58.
 360 Pechüle, 1880 V. G. Bigourdan, *C.R.*, **92**, 172. Equinox 1881-0.
 361 P/Faye, 1881 I. A. Möller, *B.J.*, 1882, [138].
 362 Swift, 1881 II. H. Kreutz, *A.N.*, **160**, 186.
 363 Tebbutt, 1881 III. J. Riem, *Deutsch. Akad.*, **66**, No. 2, 25-232. The orbit given here is Riem's IVB, from observations after perihelion passage.
 364 Schaeberle, 1881 IV. C. Stechert, *A.N.*, **108**, 228, 437. Hyperbola also given.
 365 P/Denning (1), 1881 V. B. Matthiessen, *Veröff. Sternw. Karlsruhe*, **3**, 179.
 366 Barnard, 1881 VI. E. Millosevich, *Mem. Spettr. Ital.*, **11**, 80.
 367 P/Encke, 1881 VII. O. Backlund, *Mem. Ac. St. Petersburg*, VII, **34** (8), 38.
 368 Swift, 1881 VIII. K. G. Olsson, *A.N.*, **114**, 205.
 369 Wells, 1882 I. E. von Rebeur-Paschwitz, *A.N.*, **117**, 285.
 370 Brilliant Comet, 1882 II. L. Hufnagel, *A.N.*, **209**, 17.

NOTES AND REFERENCES

- 371 Barnard, 1882 III. L. de Ball, *Pub. Kuffner Obs.*, 4, B 35. Hyperbola also given.
- 372 Brooks-Swift, 1883 I. E. Hellebrand, *A.N.*, 171, 147.
- 373 P/Ross, 1883 II. E. Moravi, *A.N.*, 184, 129.
- 374 P/Pons-Brooks, 1884 I. L. Schulhof and J. Bossert, *A.N.*, 108, 16.
- 375 P/Barnard (1), 1884 II. A. Berberich, *A.N.*, 123, 175.
- 376 P/Wolf (1), 1884 III. M. Kamienski, *Acta Astr.* (a) 3, 50.
- 377 P/Encke, 1885 I. O. Backlund, *Mem. Ac. St. Petersburg*, VII, 34 (8), 38.
- 378 Barnard, 1885 II. A. Berberich, *A.N.*, 123, 405.
- 379 Brooks, 1885 III. D. Klumpke, *Bull. Astr.*, 13, 329, 1896.
- 380 P/Tuttle, 1885 IV. J. Rahts, *A.N.*, 136, 65.
- 381 Brooks-Barnard, 1885 V. F. Cohn, *A.N.*, 135, 17.
- 382 Fabry, 1886 I. E. Redlich, *A.N.*, 187, 193.
- 383 Barnard, 1886 II. A. Thraen, *A.N.*, 132, 283.
- 384 Brooks, 1886 III. H. Kobold, *A.N.*, 182, 33; Kobold's orbit IIIA is used here.
- 385 P/Brooks (1), 1886 IV. S. Oppenheim, *A.N.*, 128, 302.
- 386 Brooks, 1886 V. G. Bucht, *A.N.*, 178, 257.
- 387 P/Pons-Winnecke, 1886 VI. E. v. Haerdtl, *Denk. Wiener Akad.*, 56, 162.
- 388 P/Finlay, 1886 VII. L. Schulhof, *Bull. Astr.*, 10, 298, 1893.
- 389 Barnard, 1886 VIII. E. Fagerholm, *A.N.*, 169, 226.
- 390 Barnard-Hartwig-Pechüle, 1886 IX. C. Buschbaum, *Diss. Inaug. Göttingen*, 1889.
- 391 Thome, 1887 I. H. Kreutz, *V.J.S.*, 36, 238.
- 392 Brooks, 1887 II. C. Stechert, *A.N.*, 165, 321.
- 393 Barnard, 1887 III. P. A. Heinricius, *A.N.*, 128, 166.
- 394 Barnard, 1887 IV. F. Muller, *A.J.*, 8, 56.
- 395 P/Olbers, 1887 V. H. Q. Rasmusen, *Pub. Copenhagen Obs.* 147.
- 396 Sawerthal-Nolan, 1888 I. J. F. Tennant, *M.N.*, 49, 285.
- 397 P/Encke, 1888 II. O. Backlund and B. Seraphimoff, *A.N.*, 119, 174.
- 398 Brooks, 1888 III. E. Millosevich, *Mem. Spett. Ital.*, 18, 155.
- 399 P/Faye, 1888 IV. A. Möller, *A.N.*, 120, 77; *B.J.*, 1882, [138]. These elements are those of No. 361; the period has been added without using perturbations.
- 400 Barnard, 1888 V. A. Dinter, *Astr. Jahresb.*, 5, 188.
- 401 Barnard-Brooks, 1889 I. G. van Biesbroeck, *Pub. Yerkes Obs.*, 8 (4), 24.
- 402 Barnard, 1889 II. F. Zweck, *A.N.*, 227, 222.
- 403 P/Barnard (2), 1889 III. A. Berberich, *A.N.*, 123, 77.
- 404 Davidson, 1889 IV. G. Horn, *A.N.*, 165, 327.
- 405 P/Brooks (2), 1889 V. A. Dubiago, *Tr. Univ. Obs. Kazan*, 31, 1950.
- 406 P/Swift (1), 1889 VI. M. J. Coniel, *Bull. Astr.*, 13, 264, 1896.
- 407 Borrelly, 1890 I. F. G. Radelfinger, *A.N.*, 142, 65.
- 408 Brooks, 1890 II. E. Strömgren, *Act. Roy. Soc. Lund*, 6.
- 409 Coggia, 1890 III. S. Ogura and H. Kaneko, *A.N.*, 200, 163.
- 410 Zona, 1890 IV. A. Venturi, *A.N.*, 140, 240.
- 411 P/d'Arrest, 1890 V. G. Leveau, *A.N.*, 124, 115.
- 412 Denning, 1890 VI. N. Bobrinskoy, *Bull. Ac. Sci. St. Petersburg*, IV, 36, 227, 1894.
- 413 P/Spitaler, 1890 VII. R. Spitaler, *Denk. Wiener Akad.*, 64, 183.
- 414 Barnard-Denning, 1891 I. E. Lamp, *Pub. Kiel Obs.*, 9, No. 1. In C., value of i , for $120^{\circ} 21' 30''$ read $120^{\circ} 31' 30''$.
- 415 P/Wolf (1), 1891 II. M. Kamienski, *Acta Astr.*, (a) 3, 50.
- 416 P/Encke, 1891 III. O. Backlund, *A.N.*, 127, 428.
- 417 Barnard, 1891 IV. H. Peck, *A.J.*, 23, 163.
- 418 P/Tempel-Swift, 1891 V. J. Bossert, *Bull. Astr.*, 14, 11, 1897.
- 419 Swift, 1892 I. E. Kühne, *A.N.*, 197, 140.
- 420 Denning, 1892 II. L. Steiner, *A.N.*, 145, 254.
- 421 P/Holmes, 1892 III. F. Koebecke, *Bull. Poznan*, Ser. B. (9), 47.
- 422 P/Pons-Winnecke, 1892 IV. E. v. Haerdtl, *A.N.*, 129, 169.
- 423 P/Barnard (3), 1892 V. J. R. Hind, *A.N.*, 137, 110.
- 424 Brooks, 1892 VI. H. Oppenheim, *A.N.*, 131, 175.
- 425 Brooks, 1893 I. J. Polak, *A.N.*, 189, 7.
- 426 Rordame-Quénisset, 1893 II. F. Kromm, *Bull. Astr.*, 12, 78, 1895.
- 427 P/Finlay, 1893 III. L. Schulhof, *A.N.*, 133, 53. Error in G.; in ω for $315^{\circ} 31' 51''$ read $315^{\circ} 13' 51''$.
- 428 Brooks, 1893 IV. D. Peyra, *A.N.*, 137, 287.
- 429 P/Denning (2), 1894 I. P. Gast, *Astr. Jahresb.*, 5, 190.
- 430 Gale, 1894 II. H. Peck, *A.J.*, 25, 182. Not very reliable.
- 431 P/Tempel (2), 1894 III. L. Schulhof, *A.N.*, 136, 91.
- 432 P/de Vico-E. Swift, 1894 IV. F. H. Seares, *A.N.*, 151, 100.
- 433 P/Encke, 1895 I. O. Backlund, *Mem. Ac. St. Petersburg*, VIII, 30 (2).
- 434 P/Swift (2), 1895 II. H. R. Morgan, *A.J.*, 19, 155. In B. for E. Swift read L. Swift.
- 435 Brooks, 1895 III. A. Wassilief, *A.N.*, 143, 229.

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- 436 Perrine, 1895 IV. R. G. Aitken, *A.J.*, **16**, 111.
 437 Perrine-Lamp, 1896 I. W. Hristoff, *V.J.S.*, **61**, 288. Both C. and B. have wrong value of q .
 438 P/Faye, 1896 II. E. Strömgren, *A.N.*, **161**, 320.
 439 Swift, 1896 III. R. G. Aitken, *A.N.*, **148**, 337. In B. for E. Swift read L. Swift.
 440 Sperra, 1896 IV. H. A. Peck, *A.J.*, **22**, 35.
 441 P/Giacobini, 1896 V. F. R. Cripps, *J.B.A.A.*, **39**, 261.
 442 P/Brooks (2), 1896 VI. A. Dubiago, *Tr. Univ. Obs. Kazan*, **31**, 1950.
 443 P/Perrine-Mrkos, 1896 VII. H. Osten, *A.N.*, **145**, 352.
 444 Perrine, 1897 I. J. Möller, *Astr. Abh.*, **1** (2), 23, with correction from *A.N.*, **171**, 47.
 445 P/d'Arrest, 1897 II. G. Leveau, *Bull. Astr.*, **20**, 312, 1903.
 446 Perrine, 1897 III. E. Wessell, *A.N.*, **151**, 210.
 447 Perrine, 1898 I. H. D. Curtis, *A.J.*, **19**, 195.
 448 P/Pons-Winnecke, 1898 II. S. C. Chandler, *A.J.*, **18**, 127. Probably a correction of E. v. Haerdtl's elements by C. Hillebrand.
 449 P/Perrine, 1898 III. O. Backlund, *Mem. Ac. St. Petersburg*, VIII, **30** (2).
 450 P/Wolf (1), 1898 IV. M. Kamienski, *Acta Astr.* (a) **3**, 50.
 451 Giacobini, 1898 V. A. Hnatek, *Sitz. Akad. Wien*, **110** (2a), 231.
 452 Perrine, 1898 VI. H. D. Curtis, *A.N.*, **182**, 337.
 453 Coddington-Pauly, 1898 VII. C. J. Merfield, *A.N.*, **154**, 230. See also *Pub. Copenhagen Obs.*, 161.
 454 Chase, 1898 VIII. M. Wasnetzoff, *A.N.*, **197**, 128.
 455 Perrine-Chofardet, 1898 IX. H. A. Peck, *A.J.*, **22**, 169.
 456 Brooks, 1898 X. S. Scharbe, *A.N.*, **164**, 377.
 457 Swift, 1899 I. A. Wedemeyer, *Astr. Jahresb.*, **4**, 188. In B. for E. Swift read L. Swift.
 458 P/Holmes, 1899 II. F. Koebecke, *Bull. Poznan*, Ser. B (9), 47.
 459 P/Tuttle, 1899 III. J. Rahts, *A.N.*, **149**, 42.
 460 P/Tempel (2), 1899 IV. L. Schulhof, *Bull. Astr.*, **16**, 302, 1899.
 461 Giacobini, 1899 V. Kr. Lous, *A.N.*, **193**, 411.
 462 Giacobini, 1900 I. A. Berberich, *A.N.*, **152**, 47.
 463 Borrelly-Brooks, 1900 II. M. S. de Mello e Simas, *Astr. Jahresb.*, **5**, 188. An orbit with very similar elements is given by J. M. Poor in *A.J.*, **23**, 183.
 464 P/Giacobini-Zinner, 1900 III. W. Abold and S. Scharbe, *V.J.S.*, **43**, 394.
 465 Viscara, 1901 I. C. J. Merfield, *Astr. Abh.*, **1**, 4 (2). Ellipse also given.
 466 P/Encke, 1901 II. O. Backlund, *Mem. Ac. St. Petersburg*, VIII, **30** (2).
 467 Brooks, 1902 I. H. Kreutz and E. Strömgren, *V.J.S.*, **38**, 65.
 468 P/Grigg-Skjellerup, 1902 II. G. Merton, *Mem. R.A.S.*, **64**, 74.
 469 Perrine-Borrelly, 1902 III. H. A. Peck and L. Lindsey, *A.J.*, **27**, 1.
 470 Giacobini, 1903 I. P. Bruck, *Bull. Astr.*, **25**, 129, 1908.
 471 Giacobini, 1903 II. R. G. Aitken, *L.O.B.*, **2**, 28.
 472 Grigg, 1903 III. H. A. Peck, *A.J.*, **24**, 175.
 473 Borrelly, 1903 IV. H. R. Morgan and E. A. Lamson, *A.J.*, **23**, 162. [Eq. 1903-0].
 474 P/Brooks (2), 1903 V. A. Dubiago, *Tr. Univ. Obs. Kazan*, **31**, 1950.
 475 Brooks, 1904 I. M. S. Kasakov, *Moscow Ann.*, Ser. 2, **8** (1), 56. See also *Pub. Copenhagen Obs.*, 105.
 476 Giacobini, 1904 II. S. Szeligowski, *Vilno Bull.*, **3**, 1923.
 477 P/Tempel (2), 1904 III. L. Schulhof, *A.N.*, **166**, 26. Misprint in this paper in log a ; for 0.4186829 read 0.4816829.
 478 P/Encke, 1905 I. O. Backlund, *Mem. Ac. St. Petersburg*, VIII, **30** (2).
 479 P/Borrelly, 1905 II. L. v. Tolnay, *A.N.*, **207**, 189.
 480 Giacobini, 1905 III. S. Szeligowski and F. Koebecke, *Acta Astr.*, (a), **3**, 66.
 481 Kopff, 1905 IV. G. Pels, *B.A.N.*, **15**, 129.
 482 Schaer, 1905 V. G. Zappa, *A.N.*, **174**, 187. Hyperbolic orbit also given.
 483 Brooks, 1905 VI. A. Michailov, *Russian A.J.*, **1** (1), 56.
 484 Giacobini, 1906 I. E. Schoenberg and E. Büss, *A.N.*, **171**, 30.
 485 Ross, 1906 II. E. A. Lamson, *A.N.*, **171**, 89.
 486 P/Holmes, 1906 III. F. Koebecke, *Bull. Poznan*, Ser. B (9), 47.
 487 P/Kopff, 1906 IV. G. Zappa, *Mem. Soc. Ital. Sci.*, (3) **18**, 139.
 488 P/Finlay, 1906 V. L. Schulhof, *A.N.*, **172**, 28.
 489 P/Metcalf, 1906 VI. E. Bianchi, *M.N.*, **82**, 382.
 490 Thiele, 1906 VII. E. Waage, *A.N.*, **200**, 65.
 491 Giacobini, 1907 I. K. Dubrowsky and B. Numerov, *A.N.*, **195**, 273.
 492 P/Grigg-Mellish, 1907 II. E. Weiss, *Denk. Wiener Akad.*, **84**, 12. Shown similar to No. 99, but not linked.
 493 P/Tuttle-Giacobini-Kresák, 1907 III. A. C. D. Crommelin, *M.N.*, **89**, 362.
 494 Daniel, 1907 IV. U. Baehr, *A.N.*, **249**, 241.
 495 Mellish, 1907 V. H. Kobold, *A.N.*, **177**, 240.
 496 P/Encke, 1908 I. O. Backlund, *Mem. Ac. St. Petersburg*, VIII, **30** (2).

NOTES AND REFERENCES

- 497 P/Tempel-Swift, 1908 II. E. Maubant, *A.N.*, **178**, 350.
- 498 Morehouse, 1908 III. G. van Biesbroeck, *Pub. Yerkes Obs.*, **8** (5), 17.
- 499 Borrelly-Daniel, 1909 I. L. Gabba, *Pub. Roy. Obs. Brera* (Milan), 52 and 57. C. has the wrong period; for 2038 read 2041.
- 500 P/Pons-Winnecke, 1909 II. E. Waage, *A.N.*, **200**, 182.
- 501 P/Perrine-Mrkos, 1909 III. H. Kobold, *A.N.*, **182**, 405.
- 502 P/Daniel, 1909 IV. F. R. Cripps, *M.N.*, **90**, 424.
- 503 Daylight Comet, 1910 I. M. S. de Mello e Simas, *A.N.*, **192**, 341.
- 504 P/Halley, 1910 II. A. C. D. Crommelin, *Mem. B.A.A.*, **19**, 32. An orbit from observations after *T* is given by F. E. Seagrave in *A.J.*, **28**, 71.
- 505 Metcalf, 1910 III. M. Viaro, *Capodimonte Contr.*, **2**, 12, 1936.
- 506 P/d'Arrest, 1910 IV. J. Braae, *A.N.*, **204**, 31.
- 507 P/Faye, 1910 V. W. F. Meyer and S. H. Levy, *L.O.B.*, **6**, 69.
- 508 P/Brooks (2), 1911 I. A. Dubiago, *Tr. Univ. Obs. Kazan*, **31**, 1950.
- 509 Kiess, 1911 II. L. Lindsey, *A.J.*, **42**, 116.
- 510 P/Encke, 1911 III. O. Backlund, *A.N.*, **190**, 49.
- 511 Beljowsky, 1911 IV. C. Grubissich, *Mem. Soc. Astr. Ital.*, **22**, 3, 265 (*Padova Contr.* 97).
- 512 Brooks, 1911 V. E. Kühne, *A.N.*, **196**, 371.
- 513 Quénnisset, 1911 VI. E. Kühne, *A.N.*, **198**, 348.
- 514 P/Schaumasse, 1911 VII. G. Fayet and A. Schaumasse, *C.R.* **154**, 682.
- 515 P/Borrelly, 1911 VIII. G. Fayet, *J. des Obs.*, **8**, 123.
- 516 P/Wolf (1), 1912 I. M. Kamienski, *Acta Astr.*, (a) **3**, 50.
- 517 Gale, 1912 II. G. Peisino and E. de Caro, *Pub. Trieste*, **2**, 6.
- 518 Borrelly, 1912 III. H. Kobold, *A.N.*, **193**, 159.
- 519 P/Tuttle, 1912 IV. N. Idelson and M. Mousselius, *Bull. Inst. Th. Astr. (Leningrad)*, No. 7 (1925).
- 520 Lowe, 1913 I. A. C. D. Crommelin, *J.B.A.A.*, **23**, 242. Very uncertain.
- 521 Schaumasse, 1913 II. F. Zagar, *A.N.*, **233**, 15.
- 522 P/Neujmin (1), 1913 III. G. van Biesbroeck, *A.J.*, **44**, 116.
- 523 Metcalf, 1913 IV. H. Kloth, *V.J.S.*, **61**, 288.
- 524 P/Giacobini-Zinner, 1913 V. M. Ebell, *A.N.*, **196**, 353.
- 525 P/Westphal, 1913 VI. M. Viljev, *A.N.*, **199**, 11.
- 526 Zlatinsky, 1914 I. A. Schwassmann and C. Vick, *A.N.*, **198**, 213.
- 527 Kritzing, 1914 II. P. Chofardet, *A.N.*, **198**, 213.
- 528 Neujmin, 1914 III. J. Svårdson, *Stockholm Iakt.*, **10**, No. 6.
- 529 Campbell-Westland-Lunt, 1914 IV. J. Dobrzycki, *Poznan Obs. Reprint*, **28**, 1953.
- 530 Delavan, 1914 V. G. van Biesbroeck, *Pub. Yerkes Obs.*, **5**, part 2.
- 531 P/Encke, 1914 VI. L. Matkewitsch, *A.N.*, **199**, 175, 427.
- 532 P/Tempel (2), 1915 I. E. Maubant, *A.N.*, **183**, 289; **200**, 279. These elements are from a prediction for 1910 (when comet was not seen) to which the period has been added, without correcting for perturbations.
- 533 Mellish, 1915 II. L. Rosenbaum, *Stockholm Iakt.*, **10**, No. 5.
- 534 P/Pons-Winnecke, 1915 III. K. Hillebrand, *A.N.*, **200**, 182.
- 535 Mellish, 1915 IV. S. Einarsson and D. Alter, *L.O.B.*, **8**, 151.
- 536 P/Taylor, 1916 I. H. M. Jeffers, *L.O.B.*, **10**, 120. The comet was in two parts; the elements given are those of component B.
- 537 P/Neujmin (2), 1916 II. G. N. Neujmin, *Bull. Polkovo Obs.*, No. 141, **17** (6), 21.
- 538 P/Perrine, 1916 III. E. Glancy, *Obs.*, **39**, 517. The comet was seen one day only.
- 539 Metcalf, 1916 IV. J. Braae and J. Vinter Hansen, *A.N.*, **203**, 388.
- 540 P/Mellish, 1917 I. S. Asklöf, *Ark. Mat. Stockholm*, **23**, An. 11, 14.
- 541 Schaumasse, 1917 II. J. Braae and J. Fischer-Petersen, *A.N.*, **204**, 275.
- 542 Wolf, 1917 III. J. C. du Pui, *J.B.A.A.*, **43**, 303.
- 543 P/Encke, 1918 I. M. Viljev, *A.N.*, **205**, 124.
- 544 Reid, 1918 II. H. E. Wood, *A.N.*, **208**, 131.
- 545 P/Schorr, 1918 III. J. Larink, *Bergedorf Mitt.*, **5**, 23.
- 546 P/Borrelly, 1918 IV. A. Schaumasse, *J. des Obs.*, **14**, 148.
- 547 P/Wolf (1), 1918 V. M. Kamienski, *Acta Astr.*, (a) **3**, 50; **9** (2), 58.
- 548 P/Kopf, 1919 I. F. Kepinski, *Stud. Soc. Sci. Turun*, Sec. F, **2**, No. 4, = *Turun Bull.*, **21**.
- 549 P/Finlay, 1919 II. S. Hasunuma, *A.N.*, **228**, 87.
- 550 P/Brorsen-Metcalf, 1919 III. P. Duckert, *A.N.*, **215**, 201.
- 551 P/Schaumasse, 1919 IV. G. Merton, *M.N.*, **87**, 567.
- 552 Metcalf-Borrelly, 1919 V. A. Przybylski, *Acta Astr.*, (a) **4**, 59.
- 553 Skjellerup, 1920 I. J. Halm, *B.Z.*, **2**, No. 7.
- 554 P/Tempel (2), 1920 II. — Kudara, *M.N.*, **81**, 305.
- 555 Taylor-Skjellerup, 1920 III. S. Einarsson and W. F. Mayer, *L.O.B.*, **10**, 98.
- 556 P/Dubiago, 1921 I. H. Hirose, *V.J.S.*, **72**, 364.
- 557 Reid, 1921 II. G. Peisino, *A.N.*, **228**, 149.

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- 558 P/Pons-Winnecke, 1921 III. C. J. Merfield, *M.N.*, **83**, 374. These elements are a simple mean of those of F. E. Seagrave in *A.J.*, **33**, 184, and **34**, 174.
- 559 P/Encke, 1921 IV. L. Matkiewicz, *M.N.*, **82**, 269.
- 560 Reid, 1921 V. H. E. Wood, *J. Astr. Soc. S. Africa*, **1**, 19. The published values of M and n are inconsistent with T as given.
- 561 P/Grigg-Skjellerup, 1922 I. G. Merton, *Mem. R.A.S.*, **64**, 96.
- 562 Baade, 1922 II. A. Gennaro, *A.N.*, **259**, 311.
- 563 Skjellerup, 1923 I. B. H. Dawson, *A.J.*, **35**, 91.
- 564 P/d'Arrest, 1923 II. F. R. Cripps, *J.B.A.A.*, **33**, 294.
- 565 Bernard-Dubiago, 1923 III. S. Kanda, *V.J.S.*, **72**, 364.
- 566 Reid, 1924 I. M. Campa, *Pub. Trieste*, **2** (5), 86. Error in B.; in e , for 0-998018 read 0-999573.
- 567 Finsler, 1924 II. V. G. Siadbey, *C.R.*, **186**, 738.
- 568 P/Encke, 1924 III. A. C. D. Crommelin, *Handbook B.A.A.*, 1924.
- 569 P/Wolf (2), 1924 IV. A. Przybylski, *Acta Astr.*, (c) **5**, 184. Identical with No. 752, P/Harrington (1), 1952 II.
- 570 Orkisz, 1925 I. L. Orkisz, *Warsaw Reprint* 21.
- 571 P/Schwassmann-Wachmann (1), 1925 II. P. Herget and B. G. Marsden, *MS*, 1960. Derived from integration schemes 1927 to 1959; the date of perihelion passage is much later than that previously adopted.
- 572 Reid, 1925 III. S. Wierzbinski, *J. des Obs.*, **39**, 7, 124.
- 573 P/Tempel (2), 1925 IV. P. Ramensky, *Tokyo Astr. Bull.*, **615**, 1230.
- 574 P/Faye, 1925 V. F. R. Cripps, *J.B.A.A.*, **35**, 186.
- 575 Shajn-Comas Solá, 1925 VI. V. V. Sakk and D. K. Kulikov, *Bull. Inst. Th. Astr. (Leningrad)*, **4** (9), 62.
- 576 van Biesbroeck, 1925 VII. G. van Biesbroeck, *A.J.*, **41**, 94.
- 577 P/Borrelly, 1925 VIII. A. Schumasse, *J. des Obs.*, **14**, 148.
- 578 P/Brooks (2), 1925 IX. A. D. Dubiago, *Bull. Engelhardt Obs.*, **32**, 3.
- 579 P/Wolf (1), 1925 X. M. Kamiński, *Bull. Ac. Sci. Polonaise*, (A) 1948.
- 580 Peltier-Wilk, 1925 XI. F. Kepinski, *Bull. Ac. Sci. Polonaise*, (A) 1927, 719.
- 581 Blathwayt, 1926 I. O. Oikawa, K. Kinoshita and S. Isii, *V.J.S.*, **63**, 77.
- 582 P/Kopff, 1926 II. F. Kepinski, *Pub. Warsaw Obs.*, **7**.
- 583 Ensor, 1926 III. V. G. Siadbey, *J. des Obs.*, **21**, 61.
- 584 P/Tuttle, 1926 IV. N. Idelson and M. Musselius, *B.Z.*, 1925, 48.
- 585 P/Finlay, 1926 V. S. Kanda and S. Hasunuma, *A.N.*, **228**, 88.
- 586 P/Giacobini-Zinner, 1926 VI. F. R. Cripps, *Handbook B.A.A.*, 1926.
- 587 Reid, 1926 VII. A. C. D. Crommelin, *J.B.A.A.*, **38**, 187.
- 588 P/Neujmin (2), 1927 I. G. N. Neujmin, *Bull. Polkovo Obs.*, No. 141, **17** (6).
- 589 Blathwayt, 1927 II. J. Vinter Hansen, *U.A.I.C.*, 160.
- 590 P/Comas Solá, 1927 III. J. Vinter Hansen, *Pub. Copenhagen Obs.*, 154.
- 591 Stearns, 1927 IV. Z. Shen and I. Imai, *J. Shanghai Sci. Inst.*, Sect. 1, **1**, 49.
- 592 P/Grigg-Skjellerup, 1927 V. G. Merton, *Obs.*, **50**, 159.
- 593 P/Gale, 1927 VI. L. E. Cunningham, *H.A.C.*, 444.
- 594 P/Pons-Winnecke, 1927 VII. M. S. de Mello e Simas, *A.N.*, **235**, 345.
- 595 P/Schumasse, 1927 VIII. S. Kanda and H. Hirose, *U.A.I.C.*, 579.
- 596 Skjellerup, 1927 IX. A. C. D. Crommelin, *M.N.*, **88**, 596.
- 597 P/Reinmuth (1), 1928 I. L. Berman and F. L. Whipple, *H.A.C.*, 65, and *L.O.B.*, 399.
- 598 P/Encke, 1928 II. L. Matkiewicz, *A.N.*, **231**, 11.
- 599 P/Crommelin, 1928 III. M. P. Candy and J. G. Porter, *Handbook B.A.A.*, 1956.
- 600 P/Schwassmann-Wachmann (2), 1929 I. H. Q. Rasmusen, *Pub. Copenhagen Obs.*, 106.
- 601 P/Forbes, 1929 II. N. Makarov, *A.J.*, **50**, 37, with correction for misprint in T .
- 602 P/Neujmin (3), 1929 III. I. Imai, *B.Z.*, **23**, No. 15, 66. The reference in *J. Shanghai Inst.* is in Japanese.
- 603 Schwassmann-Wachmann-Peltier, 1930 I. K. Kulikov, *Pub. Univ. Obs. Leningrad*, **12**, 231. Error in B., following *M.N.*, **107**, 109; in i , for 99-9037 read 99-9092.
- 604 Wilk, 1930 II. F. Koebeke, *Poznan Obs. Reprint*, **10**, 35.
- 605 Wilk, 1930 III. G. Schrutka-Rechtenstamm, *Sitz. Akad. Wien*, **161**, 265.
- 606 Beyer, 1930 IV. G. Pels, *B.A.N.*, **10**, 237.
- 607 Forbes, 1930 V. E. Senftl, *Mitt. Univ. Sternw. Wien*, **5** (13), 138. Ellipse also given.
- 608 P/Schwassmann-Wachmann (3), 1930 VI. D. A. Kalnin, *U.A.I.C.*, 1592.
- 609 Nakamura, 1930 VII. K. Nakamura, *Kwasan Bull.*, 211.
- 610 P/Tempel (2), 1930 VIII. P. Ramensky, *Tokyo Astr. Bull.*, **615**, 1230.
- 611 P/Neujmin (1), 1931 I. G. van Biesbroeck, *A.J.*, **44**, 116. Error in B., following *M.N.*, **96**, 346; in Ω for $347^{\circ} 18' 55''$ read $347^{\circ} 18' 25''$.
- 612 P/Encke, 1931 II. S. Y. Luchich, *Bull. Inst. Th. Astr. (Leningrad)*, **7** (2), 154.
- 613 Nagata, 1931 III. Z. Shen and I. Imai, *V.J.S.*, **72**, 364.
- 614 Ryves, 1931 IV. K. I. Antishina, *Astr. Circ. (U.S.S.R.)*, 196.
- 615 Carrasco, 1931 V. R. Carrasco, *Bol. Astr. Obs. Madrid*, **3**, 5.

NOTES AND REFERENCES

- 616 Houghton-Ensor, 1932 I. E. Schrutka, *U.A.I.C.*, 1081.
- 617 P/Grigg-Skjellerup, 1932 II. A. C. D. Crommelin, *M.N.*, 93, 273.
- 618 P/Kopff, 1932 III. F. Kepinski, *Bull. Ac. Sci. Polonaise*, (A), 1938, 180.
- 619 P/Borrelly, 1932 IV. A. Schaumasse, *J. des Obs.*, 15, 56; also given, with different *T*, in *U.A.I.C.* 365.
- 620 Peltier-Whipple, 1932 V. G. Schrutka-Rechtenstamm, *Mitt. Univ. Sternw. Wien*, 7, 41.
The elements given here are the mean of three selected sets.
- 621 Geddes, 1932 VI. G. van Biesbroeck, *Pub. Yerkes Obs.*, 8 (3), 13.
- 622 Newman, 1932 VII. A. Schmitt, *U.A.I.C.* 402.
- 623 P/Brooks (2), 1932 VIII. A. D. Dubiago, *Bull. Engelhardt Obs.*, 32, 3.
- 624 P/Faye, 1932 IX. F. B. Khanina and O. N. Barteneva, *Bull. Inst. Th. Astr. (Leningrad)*, 7 (6), 477.
- 625 Dodwell-Forbes, 1932 X. A. D. Maxwell, *A.J.*, 45, 65.
- 626 Peltier, 1933 I. J. P. Möller, *U.A.I.C.* 428.
- 627 P/Pons-Winnecke, 1933 II. A. E. Levin and J. G. Porter, *Handbook B.A.A.*, 1939.
- 628 P/Giacobini-Zinner, 1933 III. Y. V. Evdokimov, *M.N.*, 118, 396.
- 629 P/Whipple, 1933 IV. G. G. Cillié and W. A. Johnson, *Harvard Circ.* 409.
- 630 P/Wolf (1), 1934 I. M. Kamienski, *Bull. Ac. Sci. Polonaise*, (A), 1948.
- 631 Jackson, 1934 II. H. E. Wood, *U.A.I.C.* 547.
- 632 P/Encke, 1934 III. S. Y. Luchich, *Bull. Inst. Th. Astr. (Leningrad)*, 7 (2), 154.
- 633 Johnson, 1935 I. A. D. Maxwell, *A.J.*, 45, 49.
- 634 P/Reinmuth (1), 1935 II. F. R. Cripps, *Handbook B.A.A.*, 1949.
- 635 P/Schwassmann-Wachmann (2), 1935 III. H. Q. Rasmusen, *Q.J.R.A.S.*, 1, part 2.
- 636 P/Comas Solá, 1935 IV. J. Vinter Hansen, *Pub. Copenhagen Obs.* 85.
- 637 van Biesbroeck, 1936 I. G. van Biesbroeck, *Pub. Yerkes Obs.*, 8 (4), 7.
- 638 Peltier, 1936 II. J. Bobone, *Res. Obs. Nac. Argentino*, 36 (1), 52.
- 639 Kaho-Kozik-Lis, 1936 III. I. Nikoloff, *Mitt. Univ. Sternw. Wien*, 5 (5), 69.
- 640 P/Jackson-Neujmin, 1936 IV. B. G. Marsden, *MS*, 1961.
- 641 Hubble, 1936 V. A. Przybylski, *J. des Obs.*, 35, 120. The elements given on *U.A.I.C.* 1329 are in error; in the value of Ω , for 38°-65 read 58°-65.
- 642 P/Daniel, 1937 I. H. Hirose, *U.A.I.C.* 646.
- 643 Wilk-Peltier, 1937 II. J. Febrer and S. Ribot, *U.A.I.C.* 660.
- 644 P/Grigg-Skjellerup, 1937 III. P. J. Harris and W. P. Henderson, *Handbook B.A.A.*, 1937.
- 645 Whipple, 1937 IV. G. Chis, *Bul. Sti., Ser. Mat. Fiz. Chim.*, 2, No. 2, 164; and *Pub. Obs. Astr. Chij (Roumania)*, No. 7.
- 646 Finsler, 1937 V. J. Febrer, *U.A.I.C.* 685.
- 647 P/Encke, 1937 VI. S. Y. Luchich, *Bull. Inst. Th. Astr. (Leningrad)*, 7 (2), 154.
- 648 P/Gale, 1938. F. R. Cripps, *M.N.*, 107, 110.
- 649 Kozik-Peltier, 1939 I. A. Przybylski, *M.N.*, 113, 390.
- 650 P/Kopff, 1939 II. P. J. Harris and W. P. Henderson, *Handbook B.A.A.*, 1939.
- 651 Jurlof-Achmarof-Hassel, 1939 III. L. Belous, *Bull. Inst. Th. Astr. (Leningrad)*, 7 (9), 713.
- 652 P/Väisälä (1), 1939 IV. L. Oterma, *Handbook B.A.A.*, 1949.
- 653 P/Pons-Winnecke, 1939 V. V. L. Ananjeva, *Tr. Univ. Obs. Kazan*, 32.
- 654 P/Herschel-Rigollet, 1939 VI. A. D. Maxwell and K. P. Kaster, *A.J.*, 49, 56.
- 655 P/Brooks (2), 1939 VII. A. D. Dubiago, *Bull. Engelhardt Obs.*, 32, 3.
- 656 P/Kulin, 1939 VIII. G. Kulin, *U.A.I.C.* 810 and 904.
- 657 Friend, 1939 IX. A. M. Vergnano, *U.A.I.C.* 805.
- 658 P/Tuttle, 1939 X. A. C. D. Crommelin, *Handbook B.A.A.*, 1939.
- 659 P/Giacobini-Zinner, 1940 I. Y. V. Evdokimov, *M.N.*, 118, 396.
- 660 P/Faye, 1940 II. F. B. Khanina and O. N. Barteneva, *Bull. Inst. Th. Astr. (Leningrad)*, 7 (6), 477.
- 661 Okabayasi-Honda, 1940 III. E. L. Scott and H. A. Panofsky, *H.A.C.* 571.
- 662 Whipple-Paraskevopoulos, 1940 IV. J. P. Möller, *U.A.I.C.* 823.
- 663 Cunningham, 1941 I. M. H. Quirk and F. W. Hoffmann, *H.A.C.* 557.
- 664 Friend-Reese-Honda, A. D. Maxwell, *H.A.C.* 580.
- 665 P/Whipple, 1941 III. D. H. Sadler and F. M. McBain, *Plan. Co-ords.*, 1940-60.
- 666 de Kock-Paraskevopoulos, 1941 IV. Y. C. Chang and C. C. Li, *A.J.*, 51, 51.
- 667 P/Encke, 1941 V. S. G. Makower, *Tr. Inst. Th. Astr. (Leningrad)*, 6, 77.
- 668 P/Schwassmann-Wachmann (1), 1941 VI. P. Herget and B. G. Marsden, *MS*, 1960.
See No. 571.
- 669 P/du Toit-Neujmin-Delporte, 1941 VII. N. F. Boeva, *Bull. Inst. Th. Astr. (Leningrad)*, 5, (1), 64.
- 670 van Gent, 1941 VIII. G. Pels, *B.A.N.*, 15, 138.
- 671 P/Schwassmann-Wachmann (2), 1942 I. H. Q. Rasmusen, *Pub. Copenhagen Obs.*, 128.
- 672 P/Väisälä (2), 1942 II. Y. Väisälä, *U.A.I.C.* 910.
- 673 P/Forbes, 1942 III. F. R. Cripps, *Handbook B.A.A.*, 1942.
- 674 Whipple-Bernasconi-Kulin, 1942 IV. G. M. Iannini, *Pub. Obs. La Plata*, 21 (2), 19.

COMET CATALOGUE

- 675 P/Grigg-Skjellerup, 1942 V. F. R. Cripps, *U.A.I.C.* 929.
 676 P/Wolf (1), 1942 VI. M. Kamiński, *Bull. Ac. Sci. Polonaise*, (A), 1948.
 677 P/Oterma, 1942 VII. P. Herget and B. G. Marsden, *MS*, 1960.
 678 Oterma, 1942 VIII. L. Oterma, *U.A.I.C.* 923.
 679 P/Stephan-Oterma, 1942 IX. A. D. Dubiago, *Astr. Circ. (U.S.S.R.)*, 17, 1943.
 680 Whipple-Fedtko-Tevzadze, 1943 I. A. D. Dubiago, *Astr. Circ. (U.S.S.R.)*, 21, 1943.
 681 Daimaca, 1943 II. C. Popovici, *U.A.I.C.* 970.
 682 P/d'Arrest, 1943 III. A. W. Recht, *H.A.C.* 655.
 683 P/Daniel, 1943 IV. G. Merton, *Handbook B.A.A.* 1950.
 684 P/Schaumasse, 1943 V. M. G. Sumner, *MS*, and *M.N.*, 109, 254.
 685 van Gent-Peltier-Daimaca, 1944 I. J. P. Möller, *U.A.I.C.* 980.
 686 P/Comas Solá, 1944 II. C. Dinwoodie and W. P. Henderson, *Handbook B.A.A.* 1943.
 687 P/du Toit (1), 1944 III. J. Bobone, *Contr. Obs. Cordoba*, No. 1, 5.
 688 van Gent, 1944 IV. A. Przybylski, *Acta Astr.*, (c), 6 (3), 125.
 689 Väisälä, 1945 I. P. Herget, *H.A.C.* 695.
 690 P/du Toit (2), 1945 II. M. P. Candy, *U.A.I.C.* 1754.
 691 du Toit, 1945 III. J. Bobone, *H.A.C.* 719.
 692 P/Pons-Winnecke, 1945 IV. J. G. Porter, *M.N.*, 109, 254.
 693 P/Kopff, 1945 V. F. Kepinski, *Acta Astr.*, 7 (2).
 694 Friend-Peltier, 1945 VI. L. E. Cunningham, *U.A.I.C.* 1023.
 695 du Toit, 1945 VII. L. E. Cunningham, *H.A.C.* 733. This is the second of three different orbits.
 696 Timmers, 1946 I. G. Pels, *B.A.N.*, 15, 149.
 697 Pajdušáková-Rotbart-Weber, 1946 II. L. E. Cunningham and E. L. Scott, *H.A.C.* 751.
 698 P/Tempel (2), 1946 III. L. E. Cunningham, *H.A.C.* 842.
 699 P/Brooks (2), 1946 IV. A. D. Dubiago, *Bull. Engelhardt Obs.*, 32, 3.
 700 P/Giacobini-Zinner, 1946 V. Y. V. Evdokimov, *Astr. Circ. (U.S.S.R.)*, 159.
 701 Jones, 1946 VI. G. Pels, *B.A.N.*, 15, 155.
 702 Bester, 1947 I. L. E. Cunningham, *H.A.C.* 811.
 703 P/Grigg-Skjellerup, 1947 II. L. E. Cunningham, *H.A.C.* 821.
 704 Bečvár, 1947 III. L. E. Cunningham, *U.A.I.C.* 1088.
 705 Rondanina-Bester, 1947 IV. L. E. Cunningham, *H.A.C.* 857.
 706 Bester, 1947 V. L. E. Cunningham, *U.A.I.C.* 1104.
 707 Wirtanen, 1947 VI. L. E. Cunningham, *H.A.C.* 921.
 708 P/Reinmuth (2), 1947 VII. E. Rabe, *MS*, 1960. Elements from integration scheme, using observations 1947 and 1953-54.
 709 Wirtanen, 1947 VIII. L. E. Cunningham, *H.A.C.* 1002.
 710 P/Faye, 1947 IX. F. B. Khanina and O. N. Barteneva, *Bull. Inst. Th. Astr. (Leningrad)*, 7 (6), 477.
 711 Honda, 1947 X. K. Hurukawa, *N.A.Z.*, 7 (9), 33.
 712 P/Encke, 1947 XI. S. G. Makower, *Tr. Inst. Th. Astr. (Leningrad)*, 6, 77.
 713 Southern Comet, 1947 XII. G. Guigay, *J. des Obs.*, 33 (5), 71. Contains faulty aberration corrections.
 714 P/Wirtanen, 1947 XIII. P. Herget, *A.J.*, 65, 385.
 715 Bester, 1948 I. G. Merton, *M.N.*, 114, 368.
 716 Mrkos, 1948 II. L. E. Cunningham, *U.A.I.C.* 1168.
 717 Johnson, 1948 III. L. E. Cunningham, *H.A.C.* 1015.
 718 Honda-Bernasconi, 1948 IV. L. E. Cunningham, *H.A.C.* 915.
 719 Pajdušáková-Mrkos, 1948 V. L. E. Cunningham, *H.A.C.* 938.
 720 P/Whipple, 1948 VI. C. Dinwoodie, *Q.J.R.A.S.*, 1, part 2.
 721 P/Schwassmann-Wachmann (2), 1948 VII. C. Dinwoodie, *Handbook B.A.A.*, 1954, with subsequent corrections.
 722 P/Forbes, 1948 VIII. B. G. Marsden, *M.N.*, 119, 442.
 723 P/Ashbrook-Jackson, 1948 IX. M. Merslyakova, *M.N.*, 117, 340; also in *M.N.*, 116, 226 with slight differences.
 724 Bester, 1948 X. K. Franklin, *U.A.I.C.* 1202.
 725 Eclipse Comet, 1948 XI. W. P. Hirst, *M.N.A.S. South Africa*, 13, 33.
 726 P/Honda-Mrkos-Pajdušáková, 1948 XII. B. G. Marsden, *M.N.*, 119, 442.
 727 P/Neujmin (1), 1948 XIII. H. Raudsaar, *Bull. Inst. Th. Astr. (Leningrad)*, 7 (3), 232.
 728 Wirtanen, 1949 I. L. E. Cunningham, *U.A.I.C.* 1190.
 729 P/Johnson, 1949 II. L. E. Cunningham, *H.A.C.* 1100.
 730 P/Wilson-Harrington, 1949 III. L. E. Cunningham, *H.A.C.* 1052. Very uncertain.
 731 Bappu-Bok-Newkirk, 1949 IV. A. Schmitt, *U.A.I.C.* 1225.
 732 P/Väisälä (1), 1949 V. L. Oterma, *MS*, and *M.N.*, 119, 442.
 733 P/Shajn-Schaldach, 1949 VI. A. D. Dubiago, *Astr. Circ. (U.S.S.R.)*, 164.
 734 Johnson, 1950 I. L. E. Cunningham, *H.A.C.* 1087.
 735 P/d'Arrest, 1950 II. A. W. Recht, *Handbook B.A.A.*, 1950.

NOTES AND REFERENCES

- 736 P/Oterma, 1950 III. P. Herget and B. G. Marsden, *MS*, 1960. Derived from integration schemes 1942–57. See Nos. 677 and 804.
- 737 P/Reinmuth (1), 1950 IV. F. R. Cripps, *Handbook B.A.A.*, 1949.
- 738 P/Daniel, 1950 V. B. G. Marsden, *Q.J.R.A.S.*, 1, part 2.
- 739 P/Wolf (1), 1950 VI. M. Kamiński, *Acta Astr.*, 6 (2), 76.
- 740 P/Arend-Rigaux, 1950 VII. I. Haségawa, *U.A.I.C.* 1566.
- 741 Minkowski, 1951 I. G. Stånilä, *U.A.I.C.* 1617.
- 742 Pajdušáková, 1951 II. A. Przybylski, *U.A.I.C.* 1355.
- 743 P/Encke, 1951 III. S. G. Makower, *Tr. Inst. Th. Astr. (Leningrad)*, 6, 77.
- 744 P/Tuttle-Giacobini-Kresák, 1951 IV. L. Kresák, *Handbook B.A.A.*, 1956.
- 745 P/Neujmin (3), 1951 V. W. H. Julian, *Handbook B.A.A.*, 1951.
- 746 P/Pons-Winnecke, 1951 VI. M. P. Candy and J. G. Porter, *Handbook B.A.A.*, 1957.
- 747 P/Kopff, 1951 VII. F. Kepinski, *Acta Astr.*, (c) 7 (2), 109.
- 748 P/Tempel (2), 1951 VIII. T. A. Goodchild, *Handbook B.A.A.*, 1951.
- 749 P/Harrington-Wilson, 1951 IX. L. E. Cunningham, *U.A.I.C.* 1349.
- 750 P/Arend, 1951 X. S. U. Kan, *Bull. Inst. Th. Astr. (Leningrad)*, 7 (3), 217.
- 751 Wilson-Harrington, 1952 I. A. Przybylski, *U.A.I.C.* 1360.
- 752 P/Harrington (1), 1952 II. W. Wiśniewski, *U.A.I.C.* 1603. Since shown to be identical with P/Wolf (2), No. 569.
- 753 P/Schaumasse, 1952 III. M. Sumner, *M.N.*, 113, 390.
- 754 P/Grigg-Skjellerup, 1952 IV. C. Dinwoodie, *Handbook B.A.A.*, 1957.
- 755 Mrkos, 1952 V. J. Bobone, *U.A.I.C.* 1380.
- 756 Peltier, 1952 VI. L. E. Cunningham, *U.A.I.C.* 1378.
- 757 P/Comas Solá, 1952 VII. J. Vinter Hansen and H. Q. Rasmusen, *Handbook B.A.A.*, 1952.
- 758 Harrington, 1953 I. J. E. Forbes, H. Spinrad and D. B. Wood, *A.J.*, 63, 510.
- 759 Mrkos, 1953 II. M. Itzigsohn, *H.A.C.* 1205.
- 760 Mrkos-Honda, 1953 III. I. Haségawa, *U.A.I.C.* 1418. Probably the best of several discordant orbits.
- 761 P/Borrelly, 1953 IV. M. Sumner, *M.N.*, 115, 196.
- 762 P/Brooks (2), 1953 V. A. D. Dubiago, *Bull. Engelhardt Obs.*, 32, 3.
- 763 P/Harrington (2), 1953 VI. B. G. Marsden, *M.N.*, 118, 396.
- 764 P/Finlay, 1953 VII. M. P. Candy, *Handbook B.A.A.*, 1960.
- 765 Harrington, 1954 I. B. G. Marsden, *Q.J.R.A.S.*, 1, part 2.
- 766 Pajdušáková, 1954 II. J. Bobone, *U.A.I.C.* 1448.
- 767 P/Honda-Mrkos-Pajdušáková, 1954 III. B. G. Marsden *M.N.*, 119, 442.
- 768 P/van Biesbroeck, 1954 IV. G. van Biesbroeck, *A.J.*, 63, 503.
- 769 Abell, 1954 V. L. E. Cunningham, *U.A.I.C.* 1506, 1516.
- 770 P/Reinmuth (2), 1954 VI. E. Rabe, *MS*, 1960. From observations 1947 and 1953–54; see No. 708.
- 771 P/Pons-Brooks, 1954 VII. P. Musen, *H.A.C.* 1249.
- 772 Vožárová, 1954 VIII. I. Haségawa, *U.A.I.C.* 1486.
- 773 P/Encke, 1954 IX. S. G. Makower, *Tr. Inst. Th. Astr. (Leningrad)*, 6, 77.
- 774 Abell, 1954 X. S. Kanda, *U.A.I.C.*, 1513.
- 775 P/Wirtanen, 1954 XI. P. Herget, *A.J.*, 65, 385, with subsequent correction.
- 776 Kresák-Peltier, 1954 XII. G. Merton, *B.A.A. Circular* 355.
- 777 P/Harrington-Abell, 1954 XIII. I. Haségawa, *U.A.I.C.* 1742.
- 778 P/Schwassmann-Wachmann (2), 1955 I. C. Dinwoodie, *M.N.*, 115, 196.
- 779 P/Faye, 1955 II. F. B. Khanina, *Astr. Circ. (U.S.S.R.)* 211.
- 780 Mrkos, 1955 III. G. Merton, *M.N.*, 116, 226.
- 781 Bakharev-Macfarlane-Krienke, 1955 IV. A. D. Dubiago, *U.A.I.C.* 1519.
- 782 Honda, 1955 V. I. Haségawa, *U.A.I.C.* 1518.
- 783 Baade, 1955 VI. L. E. Cunningham, *U.A.I.C.* 1489.
- 784 P/Perrine-Mrkos, 1955 VII. H. Hirose, *U.A.I.C.* 1534. Linked 1909–55, but large residuals.
- 785 P/Whipple, 1955 VIII. C. Dinwoodie, *M.N.*, 119, 442.
- 786 Haro-Chavira, 1956 I. G. Merton, *U.A.I.C.* 1542.
- 787 P/Ashbrook-Jackson, 1956 II. M. P. Candy, *U.A.I.C.* 1487.
- 788 Mrkos, 1956 III. B. G. Marsden, *J.B.A.A.*, 68, 124.
- 789 P/Olbers, 1956 IV. H. Q. Rasmusen, *Pub. Copenhagen Obs.* 147.
- 790 P/Johnson, 1956 V. W. H. Julian and B. O. Wheel, *Handbook B.A.A.*, 1956.
- 791 P/Crommelin, 1956 VI. M. P. Candy and J. G. Porter, *Handbook B.A.A.*, 1956.
- 792 P/Grigg-Skjellerup, 1957 I. C. Dinwoodie, *Handbook B.A.A.*, 1961.
- 793 P/Tempel (2), 1957 II. R. Luss, *Handbook B.A.A.*, 1956.
- 794 Arend-Roland, 1957 III. I. Haségawa, *U.A.I.C.* 1619.
- 795 P/Schwassmann-Wachmann (1), 1957 IV. P. Herget and B. G. Marsden, *MS*, 1960. See No. 571.
- 796 Mrkos, 1957 V. G. Schrutka, *U.A.I.C.* 1740.

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- 797 Wirtanen, 1957 VI. I. Haségawa, *U.A.I.C.* 1665.
 798 P/Arend-Rigaux, 1957 VII. I. Haségawa, *U.A.I.C.* 1566.
 799 P/Encke, 1957 VIII. S. G. Makower, *Handbook B.A.A.*, 1957.
 800 Latyshev-Wild-Burnham, 1957 IX. M. P. Candy, *U.A.I.C.* 1633.
 801 P/Kopff, 1958 I. F. Kepinski, *Acta Astr.*, 8 (4).
 802 P/Reinmuth (1), 1958 II. M. G. Sumner, *Handbook B.A.A.*, 1958.
 803 Burnham, 1958 III. E. Vorobjeva and L. Ananjeva, *Astr. Circ. (U.S.S.R.)*, 211.
 804 P/Oterma, 1958 IV. P. Herget and B. G. Marsden, *MS*, 1960. See No. 736.
 805 P/Harrington (1), 1958 V. J. Kordylewski, *Acta Astr.*, 8 (2). Identical with P/Wolf (2), No. 569.
 806 P/Slaughter-Burnham, 1958 VI. E. Roemer, *U.A.I.C.* 1682.
 807 Burnham-Slaughter, 1958 *e*. M. P. Candy, *U.A.I.C.* 1661.
 808 P/Wolf (1), 1958 *c*. M. Kamienski, *Acta Astr.*, 7 (1), 6.
 809 Bester-Hoffmeister, 1959 *d*. J. Schubart, *U.A.I.C.* 1705.
 810 Alcock, 1959 *e*. M. P. Candy, *U.A.I.C.* 1695.
 811 P/Arend, 1959 *c*. W. H. F. Calway, *Handbook B.A.A.*, 1958.
 812 Alcock, 1959 *f*. M. P. Candy, *U.A.I.C.* 1698.
 813 Burnham, 1960 *a*. B. G. Marsden, *MS*, 1961.
 814 P/Giacobini-Zinner, 1959 *b*. C. Dinwoodie, *Q.J.R.A.S.*, 1, part 2.
 815 Mrkos, 1959 *j*. B. G. Marsden, *U.A.I.C.* 1708.
 816 Humason, 1960 *e*. M. P. Candy, *U.A.I.C.* 1738.
 817 P/Wild, 1960 *b*. B. G. Marsden, *U.A.I.C.* 1740.
 818 Burnham, 1959 *k*. B. G. Marsden, *U.A.I.C.* 1715.
 819 P/Schaumasse, 1959 *h*. M. G. Sumner, *Handbook B.A.A.*, 1959.
 820 P/Väisälä (1), 1959 *i*. L. Oterma, *MS*.
 821 P/Borrelly, 1960 *k*. M. G. Sumner and M. P. Candy, *Handbook B.A.A.*, 1959.
 822 P/Brooks (2), 1960 *h*. A. D. Dubiago, *Handbook B.A.A.*, 1959.
 823 P/Harrington (2), 1960 *g*. B. G. Marsden, *MS*, 1961.
 824 P/Finlay, 1960 *d*. M. P. Candy, *U.A.I.C.* 1741.
 825 P/Reinmuth (2), 1960 *c*. E. Rabe, *MS*. From integration schemes; see Nos. 708 and 770.
 826 P/Encke, 1960 *i*. S. G. Makower, *Handbook B.A.A.*, 1960; *U.A.I.C.* 1737.
 827 Candy, 1960 *n*. M. P. Candy, *U.A.I.C.* 1751.
 828 P/Comas Solá, 1960 *f*. H. Q. Rasmusen and J. Vinter Hansen, *MS*.
 829 P/Wirtanen, 1960 *m*. P. Herget, *A.J.*, 65, 385, with subsequent correction.
 830 P/Schwassmann-Wachmann (2), 1960 *j*. H. Q. Rasmusen, *Handbook B.A.A.*, 1961.

SUPPLEMENTARY TABLES

COMET CATALOGUE

APPENDIX A

PERIODIC COMETS OBSERVED AT MORE THAN ONE APPARITION

Of the periodic comets, 54 have been observed at more than one return to perihelion. The following tables give approximate elements of the orbits of these comets at each return. There are 317 sets of values, the comets being arranged in increasing order of their periods at the last return.

The time T of perihelion passage, and the period P are given to two decimals of a year, and are followed by the elements defining the size of the elliptical orbit. In addition to the elements already defined in the Introduction, these tables give the distance Q of the comet at aphelion, where $Q=a(1+e)$ and $Q+q=2a$. The classification adopted in this catalogue is also shown, and the angular elements are given to a tenth of a degree.

The tables show very clearly the remarkable changes in the elements that are caused in some cases by planetary perturbations. A less satisfactory feature disclosed by the tables is the large number of orbits which are still poorly determined. Very few of these comets have been studied systematically, so as to link together the successive apparitions of the comet in one fundamental set of elements. It cannot be too strongly emphasised that the failure of a prediction for the return of a comet is almost always due to the use of an unsatisfactory set of elements from which to compute perturbations. There is clearly an urgent need to improve many of these orbits.

T	P	e	q	Q	Class.	ω	Ω	i
P/Encke. Has made 46 appearances. Known in the U.S.S.R. as Comet Encke-Backlund.								
1786-08	3.28	0.848	0.335	4.08	B1	182.5	336.5	13.6
1795-97	3.29	0.849	0.334	4.09	B1	182.0	336.8	13.7
1805-89	3.29	0.846	0.340	4.09	B1	182.4	336.4	13.6
1819-07	3.29	0.849	0.335	4.09	A5	182.4	336.4	13.6
1822-39	3.32	0.845	0.346	4.10	A5	182.8	336.2	13.4
1825-71	3.32	0.845	0.345	4.10	A5	182.8	336.2	13.4
1829-03	3.32	0.845	0.345	4.10	A5	182.8	336.2	13.4
1832-34	3.31	0.845	0.343	4.10	A5	182.8	336.2	13.4
1835-65	3.31	0.845	0.344	4.10	A5	182.8	336.2	13.4
1838-97	3.31	0.845	0.344	4.10	A5	182.8	336.2	13.4
1842-28	3.31	0.845	0.345	4.10	A5	182.8	336.2	13.4
1845-61	3.30	0.847	0.338	4.09	A5	183.4	335.8	13.1
1848-90	3.30	0.848	0.337	4.09	A5	183.4	335.8	13.2
1852-20	3.30	0.848	0.338	4.09	A5	183.4	335.8	13.1
1855-50	3.30	0.848	0.337	4.09	A5	183.4	335.8	13.1
1858-80	3.30	0.846	0.341	4.10	A5	183.5	335.8	13.1
1862-10	3.30	0.847	0.340	4.10	A5	183.5	335.8	13.1
1865-40	3.30	0.846	0.341	4.10	A5	183.5	335.7	13.1
1868-70	3.29	0.849	0.334	4.09	A5	183.6	335.7	13.1
1871-99	3.29	0.849	0.333	4.09	A5	183.6	335.7	13.1
1875-28	3.29	0.849	0.333	4.09	A5	183.7	335.7	13.1
1878-57	3.29	0.849	0.333	4.09	A5	183.7	335.7	13.1
1881-87	3.31	0.845	0.343	4.10	A5	183.9	335.6	12.9
1885-18	3.31	0.846	0.342	4.10	A5	183.9	335.5	12.9
1888-49	3.31	0.845	0.343	4.10	p	183.9	335.5	12.9
1891-80	3.30	0.846	0.340	4.09	p	183.9	335.5	12.9
1895-10	3.30	0.845	0.343	4.09	A5	184.0	335.5	12.9
1898-40	3.30	0.846	0.341	4.10	A5	184.0	335.5	12.9
1901-71	3.30	0.846	0.342	4.10	A5	184.0	335.5	12.9
1905-03	3.30	0.847	0.339	4.09	A5	184.6	335.1	12.6
1908-33	3.30	0.848	0.338	4.09	B4	184.6	335.1	12.6
1911-63	3.30	0.847	0.338	4.09	p	184.7	335.0	12.6
1914-93	3.30	0.847	0.338	4.09	p	184.6	335.0	12.6
1918-23	3.30	0.846	0.341	4.10	p	184.7	335.0	12.5
1921-53	3.30	0.847	0.340	4.10	p	184.7	335.0	12.5
1924-83	3.31	0.846	0.341	4.10	p	184.7	335.0	12.5

APPENDICES

<i>T</i>	<i>P</i>	<i>e</i>	<i>q</i>	<i>Q</i>	<i>Class.</i>	ω	Ω	<i>i</i>
P/Encke (continued)								
1928-14	3-29	0-850	0-333	4-09	<i>p</i>	184-9	334-9	12-5
1931-42	3-28	0-850	0-332	4-09	A5	184-9	334-9	12-6
1934-70	3-28	0-850	0-332	4-09	A5	184-9	334-9	12-6
1937-99	3-29	0-850	0-332	4-09	A5	184-9	334-9	12-5
1941-29	3-31	0-846	0-341	4-10	A5	185-2	334-8	12-4
1947-90	3-30	0-846	0-341	4-10	A5	185-2	334-7	12-4
1951-20	3-30	0-847	0-338	4-09	A5	185-2	334-7	12-4
1954-50	3-30	0-847	0-338	4-09	A5	185-2	334-7	12-4
1957-80	3-30	0-847	0-338	4-09	<i>p</i>	185-2	334-7	12-4
1961-10	3-30	0-847	0-339	4-09	<i>p</i>	185-2	334-7	12-4

P/Grigg-Skjellerup

1902-50	4-83	0-739	0-746	4-97	B1	347-6	224-5	8-6
1922-37	4-98	0-695	0-889	4-94	A5	355-0	215-9	17-5
1927-35	4-99	0-694	0-893	4-95	B4	355-0	215-9	17-5
1932-36	5-02	0-691	0-908	4-96	B0	355-2	215-8	17-4
1937-39	5-02	0-690	0-908	4-96	<i>p</i>	355-3	215-7	17-4
1942-39	4-91	0-704	0-856	4-92	<i>p</i>	356-4	215-4	17-6
1947-29	4-90	0-704	0-853	4-92	B4	356-4	215-4	17-6
1952-19	4-90	0-704	0-856	4-92	B4	356-3	215-4	17-6
1957-09	4-90	0-704	0-855	4-88	B4	356-3	215-4	17-6

P/Honda-Mrkos-Pajdušáková. Not seen in 1959.

1948-88	5-22	0-814	0-559	5-46	B4	184-1	233-1	13-2
1954-10	5-21	0-815	0-556	5-46	B4	184-1	233-1	13-2

P/Tempel (2)

1873-48	5-21	0-553	1-344	4-66	A5	185-2	122-0	12-8
1878-68	5-20	0-554	1-340	4-66	A5	185-2	122-0	12-8
1894-31	5-22	0-551	1-351	4-67	A4	185-1	121-9	12-7
1899-57	5-28	0-542	1-389	4-68	<i>p</i>	185-6	121-7	12-6
1904-86	5-28	0-542	1-388	4-68	<i>p</i>	185-8	121-6	12-6
1915-28	5-17	0-558	1-323	4-66	<i>p</i>	186-7	121-2	12-8
1920-44	5-16	0-558	1-321	4-65	B0	186-7	121-2	12-8
1925-60	5-16	0-560	1-313	4-66	A5	186-6	121-1	12-8
1930-76	5-17	0-559	1-319	4-66	A5	186-6	121-1	12-8
1946-50	5-31	0-542	1-393	4-69	B4	190-9	119-4	12-4
1951-81	5-30	0-543	1-391	4-69	<i>p</i>	191-0	119-4	12-4
1957-10	5-27	0-548	1-369	4-68	<i>p</i>	191-0	119-3	12-5

P/Neujmin (2)

1916-19	5-43	0-566	1-340	4-84	A5	193-8	328-0	10-6
1927-04	5-43	0-567	1-338	4-79	A5	193-7	328-0	10-6

P/Brorsen

1846-15	5-57	0-793	0-650	5-63	B4	13-8	104-1	30-9
1857-24	5-54	0-802	0-621	5-64	A5	14-0	103-1	29-8
1868-29	5-48	0-808	0-597	5-62	A5	14-8	102-3	29-4
1873-77	5-48	0-809	0-594	5-62	A5	14-8	102-3	29-4
1879-24	5-46	0-810	0-590	5-61	A5	14-9	102-3	29-4

COMET CATALOGUE

<i>T</i>	<i>P</i>	<i>e</i>	<i>q</i>	<i>Q</i>	<i>Class.</i>	ω	Ω	<i>i</i>
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P/Tuttle-Giacobini-Kresák. The lengthy investigations of this comet by the Computing Section in 1936 gave indefinite results. It is now clear that the elements for 1858 and 1907 are erroneous; there were nine revolutions between these dates, giving a period of 5.45 years. (See *Handbook B.A.A.*, 1956.) Not seen in 1956.

1858-34	6.02	0.654	1.146	5.47	B0	25.6	176.7	19.3
1907-40	4.13	0.554	1.147	4.00	B0	36.0	168.4	13.6
1951-35	5.48	0.641	1.117	5.10	A2	37.9	165.6	13.8

P/Tempel-Swift

1869-88	5.48	0.658	1.063	5.16	A5	106.1	298.0	5.4
1880-85	5.49	0.657	1.067	5.16	A5	106.1	297.9	5.4
1891-88	5.54	0.653	1.086	5.17	B4	106.7	297.4	5.4
1908-75	5.68	0.638	1.153	5.21	<i>p</i>	113.6	290.9	5.4

P/de Vico-E. Swift

To APPENDIX B. 4D	1678-63	5.38	0.627	1.145	5.00	B1	159.6	167.0	2.8
	1844-67	5.46	0.617	1.186	5.01	A3	278.9	65.0	2.9
	1894-78	5.86	0.572	1.392	5.11	A2	296.7	49.4	3.0

P/Tempel (1)

1867-39	5.69	0.510	1.564	4.81	A4	135.1	102.3	6.4
1873-35	5.98	0.463	1.771	4.82	A5	159.4	79.7	9.8
1879-35	5.98	0.463	1.771	4.82	A5	159.5	79.7	9.8

P/Pons-Winnecke. Not seen in 1957.

1819-55	5.62	0.755	0.774	5.55	A2	161.6	114.9	10.7
1858-33	5.56	0.755	0.769	5.50	A5	162.2	114.8	10.8
1869-49	5.59	0.752	0.782	5.52	A5	162.4	114.6	10.8
1875-19	5.73	0.741	0.829	5.57	A4	165.2	112.5	11.3
1886-68	5.82	0.726	0.885	5.58	A5	172.1	104.9	14.5
1892-50	5.82	0.726	0.887	5.58	<i>p</i>	172.1	104.9	14.5
1898-22	5.83	0.715	0.924	5.56	<i>p</i>	173.4	101.6	17.0
1909-77	5.88	0.701	0.973	5.54	B2	172.3	99.9	18.3
1915-67	5.87	0.701	0.972	5.54	<i>p</i>	172.3	99.9	18.3
1921-45	6.01	0.685	1.041	5.57	B2	170.3	98.5	18.9
1927-47	6.01	0.686	1.039	5.57	B2	170.4	98.5	18.9
1933-38	6.09	0.670	1.102	5.57	B4	169.3	96.9	20.1
1939-47	6.09	0.670	1.101	5.57	A5	169.3	96.8	20.1
1945-52	6.16	0.655	1.159	5.56	A4	170.1	94.5	21.7
1951-69	6.12	0.653	1.161	5.53	B4	170.2	94.4	21.7

P/Kopff

1906-33	6.58	0.517	1.698	5.33	B4	19.7	264.3	8.7
1919-49	6.60	0.515	1.707	5.33	A5	19.7	264.3	8.7
1926-07	6.58	0.516	1.698	5.32	A5	19.7	264.3	8.7
1932-64	6.56	0.518	1.688	5.32	A5	19.7	264.2	8.7
1939-19	6.56	0.519	1.685	5.32	<i>p</i>	19.8	264.2	8.7
1945-61	6.18	0.556	1.496	5.24	A5	31.5	253.1	7.2
1951-80	6.18	0.556	1.495	5.24	A5	31.7	253.0	7.2
1958-05	6.32	0.556	1.516	5.32	<i>p</i>	161.7	121.0	4.7

APPENDICES

<i>T</i>	<i>P</i>	<i>e</i>	<i>q</i>	<i>Q</i>	<i>Class.</i>	ω	Ω	<i>i</i>
P/Giacobini-Zinner								
1900-91	6-52	0-733	0-932	6-05	A2	171-1°	197-4°	29-8°
1913-84	6-51	0-720	0-976	6-00	C2	171-5	196-4	30-7
1926-94	6-57	0-717	0-994	6-02	<i>p</i>	171-7	196-3	30-7
1933-53	6-60	0-716	1-000	6-04	A5	171-8	196-2	30-7
1940-13	6-59	0-717	0-996	6-03	A5	171-8	196-2	30-7
1946-71	6-59	0-717	0-996	6-04	A5	171-8	196-3	30-7
1959-82	6-42	0-729	0-936	5-97	B4	172-8	196-0	30-9
P/Forbes. Not seen in 1955.								
1929-48	6-38	0-556	1-528	5-35	A5	259-5	25-8	4-6
1942-29	6-43	0-552	1-549	5-37	<i>p</i>	259-6	25-6	4-6
1948-71	6-42	0-553	1-545	5-36	A4	259-7	25-4	4-6
P/Perrine-Mrkos. The 1955 elements were linked with the others, but there were large residuals.								
1896-90	6-44	0-679	1-110	5-81	A2	163-9	247-3	13-7
1909-83	6-45	0-662	1-173	5-76	B2	166-8	242-9	15-7
1955-74	6-47	0-667	1-154	5-79	B4	167-8	242-6	15-9
P/Wolf-Harrington. The identity of P/Wolf (2), 1924 IV, with P/Harrington (1), 1952 II, has been established, but the elements have not been linked.								
1925-03	7-59	0-371	2-428	5-29	A2	180-1	260-7	23-7
1952-10	6-50	0-541	1-599	5-36	A2	186-9	254-3	18-5
1958-61	6-51	0-540	1-604	5-37	<i>p</i>	187-0	254-2	18-5
P/Schwassmann-Wachmann (2)								
1929-22	6-42	0-395	2-091	4-82	A5	357-7	126-3	3-7
1935-66	6-42	0-394	2-095	4-82	A5	358-0	126-3	3-7
1942-12	6-52	0-385	2-144	4-83	<i>p</i>	358-0	126-0	3-7
1948-64	6-53	0-384	2-152	4-83	B4	358-1	126-0	3-7
1955-16	6-53	0-385	2-150	4-84	<i>p</i>	357-9	126-0	3-7
1961-68	6-53	0-383	2-157	4-83	<i>p</i>	357-7	126-0	3-7
P/Biela								
1772-13	6-77	0-725	0-986	6-17	B4	213-0	259-8	17-1
1806-00	6-73	0-746	0-907	6-22	B2	218-1	253-4	13-6
1826-21	6-72	0-747	0-902	6-22	B2	218-3	253-3	13-6
1832-90	6-65	0-751	0-879	6-19	B4	221-7	250-0	13-2
1846-11	6-60	0-757	0-856	6-18	B4	223-1	247-4	12-6
1852-73	6-62	0-756	0-861	6-19	B4	223-2	247-3	12-6
P/Daniel. Not seen in 1957. The orbit of this comet would repay further study.								
1909-91	6-48	0-603	1-382	5-57	B0	3-5	71-5	19-5
1937-07	6-82	0-573	1-536	5-66	<i>p</i>	6-0	70-5	19-8
1943-89	6-80	0-575	1-527	5-65	B4	6-1	70-4	19-8
1950-64	6-66	0-586	1-465	5-62	B4	7-3	69-7	19-7
P/Wirtanen								
1947-92	6-71	0-540	1-635	5-48	A5	343-5	86-5	13-4
1954-61	6-69	0-542	1-625	5-47	A5	343-5	86-5	13-4
1961-29	6-67	0-543	1-618	5-47	<i>p</i>	343-5	86-5	13-4

COMET CATALOGUE

<i>T</i>	<i>P</i>	<i>e</i>	<i>q</i>	<i>Q</i>	<i>Class.</i>	ω	Ω	<i>i</i>
P/d'Arrest. Not seen in 1957. This orbit needs attention.								
1851-52	6-39	0-659	1-173	5-71	A5	174-5	149-8	13-9
1857-91	6-38	0-660	1-170	5-71	A5	174-6	149-7	13-9
1870-73	6-57	0-635	1-280	5-73	A5	172-3	147-5	15-6
1877-36	6-66	0-628	1-318	5-76	A5	173-0	147-1	15-7
1890-71	6-69	0-627	1-324	5-78	<i>p</i>	173-0	147-1	15-7
1897-39	6-69	0-626	1-327	5-77	A5	173-0	147-1	15-7
1910-71	6-54	0-637	1-270	5-73	<i>p</i>	173-8	146-9	15-8
1923-70	6-63	0-617	1-352	5-71	<i>p</i>	174-1	143-9	18-1
1943-73	6-71	0-611	1-386	5-73	<i>p</i>	174-4	143-6	18-0
1950-43	6-70	0-612	1-378	5-73	<i>p</i>	174-4	143-6	18-1
P/Arend-Rigaux ☾ 527.								
1950-96	6-71	0-610	1-386	5-73	A2	326-3	124-7	17-2
1957-69	6-71	0-611	1-385	5-73	<i>p</i>	326-4	124-6	17-2
P/Reinmuth (2)								
1947-63	6-59	0-469	1-867	5-16	A5	43-9	297-4	7-1
1954-23	6-59	0-469	1-868	5-16	A5	44-3	297-2	7-1
1960-90	6-71	0-457	1-933	5-18	<i>p</i>	45-5	296-2	7-0
P/Brooks (2). A close approach to Jupiter in 1886 reduced the period from 29-2 years to 7-07 years (see C. L. Poor, <i>Annals Ac. Sci. New York</i> , 15, 1904).								
1889-75	7-07	0-471	1-950	5-42	A5	343-6	18-8	6-1
1896-84	7-10	0-469	1-959	5-43	A5	343-8	18-7	6-1
1903-93	7-10	0-470	1-959	5-43	A5	343-6	18-7	6-1
1911-02	7-10	0-469	1-963	5-43	A5	343-5	18-8	6-1
1925-83	6-92	0-487	1-862	5-40	A5	195-7	177-8	5-5
1932-77	6-94	0-486	1-870	5-41	A5	195-8	177-7	5-5
1939-70	6-95	0-486	1-871	5-41	A5	195-7	177-7	5-5
1946-65	6-96	0-485	1-879	5-41	A5	195-6	177-7	5-5
1953-60	6-93	0-487	1-866	5-40	A5	195-7	177-7	5-6
1960-46	6-72	0-505	1-763	5-36	<i>p</i>	197-1	176-9	5-6
P/Harrington 465								
1953-72	6-98	0-536	1-694	5-41	B2	219-4	136-6	11-6
1960-49	6-80	0-559	1-582	5-60	<i>p</i>	232-8	119-2	8-7
P/Holmes								
1892-45	6-90	0-410	2-141	5-11	A5	14-3	332-5	20-8
1899-32	6-87	0-411	2-128	5-10	A5	14-1	332-4	20-8
1906-20	6-86	0-412	2-121	5-10	A5	14-3	332-4	20-8
P/Johnson								
1949-71	6-85	0-377	2-248	4-97	B2	206-0	118-2	13-9
1956-56	6-87	0-375	2-259	4-97	<i>p</i>	205-9	118-2	13-9
P/Finlay								
1886-89	6-65	0-718	0-998	6-07	A5	315-2	53-2	3-0
1893-53	6-62	0-720	0-989	6-06	<i>p</i>	315-4	53-1	3-0
1906-68	6-54	0-724	0-965	6-03	<i>p</i>	315-9	52-9	3-1
1919-79	6-69	0-715	1-013	6-09	B0	318-2	47-3	3-4
1926-60	6-84	0-706	1-058	6-15	<i>p</i>	320-6	45-6	3-4
1953-98	6-81	0-708	1-049	6-14	A4	321-1	45-4	3-4
1960-67	6-90	0-703	1-077	6-17	B4	321-6	42-1	3-6

APPENDICES

<i>T</i>	<i>P</i>	<i>e</i>	<i>q</i>	<i>Q</i>	<i>Class.</i>	<i>ω</i>	<i>Ω</i>	<i>i</i>
P/Borrelly								
1905-04	6-91	0-615	1-395	5-86	A0	352-3	77-4	30-5
1911-96	6-93	0-614	1-403	5-87	A5	352-4	77-4	30-4
1918-88	6-91	0-615	1-396	5-86	A2	352-4	77-4	30-5
1925-77	6-89	0-616	1-388	5-85	<i>p</i>	352-4	77-4	30-5
1932-65	6-87	0-617	1-385	5-85	<i>p</i>	352-6	77-3	30-5
1953-43	7-01	0-604	1-448	5-87	B4	350-7	76-2	31-1
1960-45	7-02	0-604	1-452	5-88	<i>p</i>	350-8	76-2	31-1
P/Faye								
1843-79	7-44	0-556	1-692	5-93	A5	200-0	211-0	11-4
1851-25	7-46	0-555	1-700	5-94	A5	200-1	210-9	11-4
1858-70	7-45	0-556	1-694	5-93	A5	200-1	211-0	11-4
1866-12	7-41	0-558	1-682	5-92	A5	200-2	210-9	11-4
1873-54	7-41	0-557	1-683	5-92	<i>p</i>	200-4	210-8	11-4
1881-06	7-57	0-549	1-738	5-97	<i>p</i>	201-2	210-6	11-3
1888-64		as	1881.....	<i>p</i>		as	1881.....	
1896-21	7-58	0-549	1-740	5-98	B4	201-2	210-6	11-3
1910-83	7-44	0-566	1-655	5-97	B2	199-3	206-8	10-6
1925-60	7-31	0-572	1-614	5-92	<i>p</i>	199-7	206-6	10-6
1932-93	7-32	0-570	1-620	5-92	A5	200-1	206-5	10-6
1940-31	7-42	0-565	1-654	5-95	A5	200-5	206-4	10-6
1947-74	7-44	0-564	1-663	5-96	A5	200-5	206-4	10-5
1955-17	7-41	0-565	1-652	5-95	A5	200-6	206-3	10-6
P/Whipple								
1933-58	7-49	0-348	2-497	5-16	A5	190-5	188-8	10-2
1941-06	7-47	0-350	2-485	5-16	<i>p</i>	190-5	188-8	10-2
1948-48	7-41	0-356	2-449	5-15	B4	190-1	188-6	10-2
1955-91	7-42	0-356	2-450	5-16	B4	190-4	188-5	10-3
P/Ashbrook-Jackson								
1948-76	7-48	0-396	2-311	5-34	A2	348-9	2-3	12-5
1956-26	7-51	0-394	2-324	5-34	<i>p</i>	349-1	2-3	12-5
P/Reinmuth (1)								
1928-08	7-24	0-503	1-860	5-62	B2	8-7	125-2	8-1
1935-32	7-23	0-504	1-856	5-62	B4	8-8	125-2	8-1
1950-56	7-69	0-477	2-037	5-75	<i>p</i>	12-9	123-6	8-4
1958-23	7-65	0-478	2-026	5-74	<i>p</i>	12-9	123-6	8-4
P/Arend								
1951-90	7-77	0-536	1-821	6-02	A2	44-5	357-7	21-7
1959-67	7-79	0-534	1-832	6-03	<i>p</i>	44-5	357-6	21-7
P/Oterma. Observable at each opposition; the elements are now well determined. Original period before 1936 was 18 years; another close approach to Jupiter in 1963 will increase the period again to 19-2 years (see L. Oterma, <i>Turku Informo</i> No. 17).								
1942-64	7-89	0-144	3-389	4-53	A5	354-8	155-2	4-0
1950-54	7-92	0-143	3-405	4-54	A5	354-8	155-1	4-0
1958-44	7-88	0-144	3-388	4-53	A5	354-9	155-1	4-0

COMET CATALOGUE

<i>T</i>	<i>P</i>	<i>e</i>	<i>q</i>	<i>Q</i>	<i>Class.</i>	ω	Ω	<i>i</i>
P/Schaumasse								
1911-87	8-07	0-695	1-226	6-82	B2	44-2	94-2	17-7
1919-80	7-94	0-706	1-168	6-79	A5	45-8	91-0	14-7
1927-75	7-95	0-706	1-172	6-80	A5	46-0	90-9	14-7
1943-90	8-21	0-704	1-203	6-93	B4	50-9	86-9	12-1
1952-11	8-17	0-706	1-194	6-92	B4	51-8	86-4	12-0
1960-29	8-18	0-705	1-196	6-92	<i>p</i>	52-0	86-2	12-0
P/Wolf ~~65~~								
1884-88	6-77	0-561	1-572	5-59	A5	172-7	207-3	25-3
1891-68	6-89	0-557	1-604	5-64	A5	172-8	207-2	25-2
1898-51	6-84	0-555	1-603	5-61	A5	172-9	207-2	25-2
1912-15	6-80	0-558	1-587	5-59	A5	172-8	207-2	25-3
1918-95	6-79	0-559	1-582	5-59	A5	172-9	207-1	25-3
1925-85	8-28	0-405	2-435	5-75	A5	160-7	204-4	27-3
1934-16	8-33	0-404	2-450	5-77	A5	160-8	204-4	27-3
1942-48	8-29	0-405	2-437	5-75	A5	161-0	204-3	27-3
1950-81	8-42	0-396	2-498	5-78	A5	161-1	203-9	27-3
1959-22	8-43	0-395	2-507	5-78	B4	161-1	203-9	27-3
P/Comas Solá								
1927-22	8-52	0-575	1-772	6-57	A5	38-5	65-9	13-8
1935-76	8-54	0-575	1-777	6-58	<i>p</i>	38-8	65-7	13-7
1944-28	8-50	0-576	1-766	6-56	<i>p</i>	38-9	65-7	13-7
1952-69	8-55	0-578	1-766	6-60	<i>p</i>	39-9	62-9	13-5
1961-26	8-59	0-576	1-777	6-61	<i>p</i>	40-0	62-8	13-4
P/Väisälä (1)								
1939-32	10-58	0-634	1-762	7-87	A5	44-3	135-6	11-3
1949-86	10-53	0-635	1-752	7-85	A5	44-3	135-5	11-3
1960-35	10-46	0-636	1-741	7-82	<i>p</i>	44-4	135-4	11-3
P/Neujmin (3)								
1929-49	10-90	0-585	2-042	7-79	A0	140-8	158-5	3-7
1951-40	10-95	0-588	2-032	7-83	<i>p</i>	144-8	156-2	3-8
P/Gale. Not seen 1949, 1960.								
1927-45	11-19	0-757	1-213	8-79	A0	209-9	67-4	11-6
1938-46	10-99	0-761	1-183	8-70	B4	209-1	67-3	11-7
P/Tuttle. Not seen in 1953; orbit requires investigation.								
1790-08	13-90	0-819	1-044	10-52	A5	207-1	270-9	54-1
1858-15	13-74	0-821	1-026	10-45	A5	206-8	270-3	54-4
1871-92	13-82	0-821	1-030	10-49	A5	206-8	270-4	54-3
1885-69	13-76	0-822	1-025	10-46	A5	206-8	270-5	54-3
1899-34	13-67	0-822	1-019	10-41	<i>p</i>	206-6	270-5	54-5
1912-82	13-51	0-818	1-030	10-31	B4	207-0	270-3	55-0
1926-32	13-54	0-819	1-031	10-33	<i>p</i>	207-0	270-1	55-0
1939-86	13-61	0-821	1-022	10-38	<i>p</i>	207-0	269-8	54-7

APPENDICES

<i>T</i>	<i>P</i>	<i>e</i>	<i>q</i>	<i>Q</i>	<i>Class.</i>	<i>ω</i>	<i>Ω</i>	<i>i</i>
P/Schwassmann-Wachmann (1). Visible at each opposition; elements now well determined. Subject to remarkable variations of brightness.								
1925-35	16-37	0-150	5-477	7-42	A5	359-3	323-1	9-4
1941-30	16-15	0-135	5-523	7-25	A5	356-2	322-0	9-5
1957-36	16-10	0-131	5-538	7-21	A5	355-8	321-6	9-5
P/Neujmin (1)								
1913-62	17-77	0-775	1-529	12-09	A5	346-2	348-4	14-8
1931-33	17-69	0-775	1-528	12-05	A5	347-0	347-6	15-2
1948-96	17-97	0-774	1-547	12-17	A5	346-7	347-2	15-0
P/Crommelin. Originally Comet Pons-Coggia-Winnecke-Forbes, but renamed in 1948. A faint comet; the elements are not well determined.								
1457-07	[28]	0-921	0-728	17-71	B1	204-2	242-1	23-7
1625-08	27-21	0-918	0-739	17-35	B1	196-4	252-5	29-0
1818-10	27-73	0-918	0-747	17-57	B4	195-7	251-4	29-1
1873-92	28-03	0-919	0-747	17-71	B4	196-1	250-9	28-8
1928-84	27-90	0-919	0-745	17-65	B4	196-0	250-3	28-9
1956-80	27-87	0-919	0-743	17-64	<i>p</i>	196-0	250-4	28-9
P/Tempel-Tuttle. The elements for 1366 assume identity with 1866. The orbit resembles that of the Leonid meteors.								
1366-8	33-35	0-906	0-975	19-7	B0	166-7	226-5	149-7
1866-03	33-18	0-905	0-977	19-67	A2	170-9	232-6	162-7
P/Stephan-Oterma. The two sets of elements are not linked.								
1867-05	40-09	0-865	1-577	21-85	A2	357-6	79-6	18-2
1942-96	38-96	0-861	1-596	21-39	B2	358-4	78-6	17-9
P/Westphal								
1852-78	61-56	0-920	1-250	29-93	A5	57-1	347-5	40-9
1913-90	61-73	0-920	1-254	29-98	B5	57-1	347-3	40-9
P/Brorsen-Metcalf								
1847-69	68-06	0-971	0-488	32-85	A5	129-4	311-2	19-1
1919-79	69-06	0-971	0-485	33-18	A5	129-5	311-2	19-2
P/Olbers								
1815-32	74-90	0-932	1-213	34-32	A5	65-6	85-3	44-5
1887-77	72-41	0-931	1-199	33-54	A5	65-3	85-4	44-6
1956-45	69-57	0-930	1-179	32-65	<i>p</i>	64-6	85-4	44-6
P/Pons-Brooks. The three sets of elements are not linked.								
1812-71	73-19	0-956	0-777	34-22	A2	199-3	254-9	74-0
1884-07	71-56	0-955	0-776	33-70	A2	199-2	255-1	74-0
1954-39	70-86	0-955	0-774	33-47	A2	199-0	255-2	74-2

COMET CATALOGUE

<i>T</i>	<i>P</i>	<i>e</i>	<i>q</i>	<i>Q</i>	<i>Class.</i>	<i>ω</i>	<i>Ω</i>	<i>i</i>
P/Halley. The work of Cowell and Crommelin proved the identity of this comet at 29 returns, but few of these sets of elements are at all precise. The elements for 1910, and the return in 1986 are under investigation by Zadunaisky.								
—239·4	76·9	0·967	0·60	35·6	D1	110°	58°	162°
—162·4	76·6	0·967	0·60	35·5	D1	110	57	162
—86·6	76·8	0·967	0·60	35·5	D1	110	57	162
—11·8	76·3	0·967	0·60	35·4	D1	109	56	162
66·1	76·5	0·967	0·60	35·4	D1	109	56	162
141·2	77·4	0·967	0·60	35·7	D1	109	55	163
218·3	77·4	0·967	0·60	35·7	D1	109	55	163
295·3	79·4	0·967	0·60	36·3	D1	109	55	163
374·1	78·7	0·967	0·60	36·1	D1	109	54	163
451·5	79·5	0·967	0·60	36·4	D1	109	54	164
530·9	78·7	0·967	0·60	36·1	D1	109	53	163
607·2	77·4	0·967	0·60	35·7	D1	108	53	163
684·8	77·6	0·967	0·60	35·8	D1	108	53	163
760·4	76·9	0·967	0·60	35·6	D1	108	53	163
837·1	76·8	0·967	0·60	35·5	D1	108	53	163
912·5	77·7	0·967	0·60	35·8	D1	109	54	163
989·7	77·2	0·967	0·584	35·7	D1	111	58	163
1066·23	79·4	0·967	0·610	36·35	D1	105·6	51·2	163·6
1145·30	79·0	0·967	0·608	36·21	D1	105·7	51·4	163·6
1222·69	79·2	0·967	0·608	36·25	D1	105·8	52·4	163·6
1301·81	79·1	0·967	0·608	36·25	D1	107	53	163
1378·85	77·8	0·967	0·601	35·84	D1	108·0	55·5	162·1
1456·43	76·61	0·968	0·580	36·20	A1	105·0	50·8	162·4
1531·65	[75]	0·967	0·580	34·99	B1	104·5	51·5	163·0
1607·82	75·51	0·967	0·588	35·14	B4	107·2	53·6	162·8
1682·70	77·45	0·968	0·583	35·76	A5	109·4	55·0	162·3
1759·19	76·93	0·968	0·585	35·59	A4	110·7	56·6	162·4
1835·87	76·30	0·967	0·587	35·39	A5	110·7	56·8	162·3
1910·30	76·03	0·967	0·587	35·31	<i>p</i>	111·7	57·8	162·2

P/Herschel-Rigollet. The two sets of elements are not linked.

1788·89	—	1·0	0·757	—	A2	30·4	354·7	64·5
1939·60	156·0	0·974	0·748	57·22	A2	29·3	355·3	64·2

P/Grigg-Mellish. The two sets of elements are not linked.

1742·10	164·3	0·975	0·762	59·24	A2	327·1	188·3	112·7
1907·23	164·3	0·969	0·923	59·08	A2	328·4	189·8	109·8

APPENDICES

APPENDIX B

PERIODIC COMETS OF ONE APPARITION ONLY

Approximate elements are given for 40 periodic comets which have been observed at one apparition only; the comets are listed in order of increasing period.

<i>Name</i>	<i>T</i>	<i>P</i>	<i>e</i>	<i>q</i>	<i>ω</i>	<i>Ω</i>	<i>i</i>
Wilson-Harrington	1949-78	2-31	0-412	1-028	91-9	278-7	2-2
Helfenzrieder	1766-32	4-51	0-852	0-403	178-1	76-1	7-9
Blanpain	1819-89	5-10	0-699	0-892	350-2	79-2	9-1
du Toit (2)	1945-30	5-28	0-588	1-250	201-5	358-9	6-9
Barnard (1)	1884-62	5-40	0-584	1-280	301-1	6-1	5-5
Schwassmann-Wachmann (3) ..	1930-45	5-43	0-673	1-011	192-3	77-1	17-4
Grischow	1743-02	5-44	0-721	0-862	7-2	89-0	1-9
du Toit-Neujmin-Delporte ..	1941-55	5-54	0-583	1-305	69-3	229-6	3-3
Brooks (1)	1886-43	5-60	0-579	1-328	176-8	54-3	12-7
Lexell	1770-62	5-60	0-786	0-674	224-9	133-9	1-6
Kulin	1939-76	5-64	0-448	1-749	292-8	137-6	4-8
Pigott	1783-88	5-89	0-552	1-459	354-6	58-0	45-1
Taylor	1916-08	6-37	0-546	1-558	354-8	114-4	15-5
Spitaler	1890-82	6-37	0-471	1-817	13-3	45-9	12-8
Harrington-Wilson	1951-83	6-38	0-516	1-665	343-0	127-8	16-4
Barnard (3)	1892-94	6-63	0-594	1-434	169-9	207-3	31-3
Giacobini	1896-82	6-65	0-588	1-455	140-5	194-2	11-4
Schorr	1918-74	6-71	0-471	1-882	278-7	118-3	5-6
Harrington-Abell	1954-95	7-20	0-523	1-777	338-3	145-9	16-8
Swift (2)	1895-64	7-22	0-652	1-298	167-8	171-1	3-0
Shajn-Schaldach	1949-90	7-28	0-405	2-234	215-3	167-4	6-2
Denning (2)	1894-11	7-42	0-698	1-147	46-3	85-1	5-5
Metcalf	1906-77	7-77	0-584	1-632	200-0	195-1	14-6
Jackson-Neujmin	1936-75	8-57	0-651	1-463	197-3	164-4	13-3
Denning (1)	1881-70	8-69	0-828	0-725	312-6	66-8	6-9
Swift (1)	1889-91	8-92	0-685	1-356	69-7	331-3	10-3
Slaughter-Burnham	1958-68	11-64	0-504	2-545	44-4	346-2	8-2
van Biesbroeck	1954-14	12-43	0-550	2-415	134-3	149-0	6-6
Wild	1960-21	13-19	0-655	1-927	166-7	359-0	19-7
Peters	1846-42	13-38	0-729	1-529	339-6	261-9	30-7
du Toit (1)	1944-46	14-79	0-788	1-277	257-0	22-5	18-7
Perrine	1916-45	16-35	0-927	0-470	95	224	103
Pons-Gambart	1827-43	63-83	0-949	0-807	19-3	319-4	136-4
Ross	1883-98	64-63	0-981	0-309	137-6	265-2	114-7
Dubiago	1921-34	67-01	0-932	1-116	97-4	66-5	22-3
de Vico	1846-18	75-71	0-963	0-664	12-9	79-0	85-1
Väisälä (2)	1942-13	85-52	0-934	1-287	335-2	171-6	38-0
Swift-Tuttle	1862-64	119-6	0-960	0-963	152-8	138-7	113-6
Barnard (2)	1889-47	128-3	0-957	1-102	60-1	271-8	31-2
Mellish	1917-27	145-3	0-993	0-190	121-3	88-0	32-7

1678-63 5-38 0-627 1-145 159-6 167-0 2-8

✓ P/LA HIRE

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APPENDIX C

HYPERBOLIC ORBITS

About half of the 65 hyperbolic orbits in the present catalogue are sufficiently well determined to allow of an investigation of the original (or future) nature of their orbits. In general, the method used is to extend the calculation of perturbations backwards (or forwards) in time, until the comet has reached such a distance from the solar system that no further changes in the elements are appreciable. The nature of the orbit is then determined from the barycentric co-ordinates of the comet at that time.

The following list gives original, osculating and future values of $1/a$ in units of the sixth decimal. The table is based mainly on the values listed by E. Strömgren (*Pub. Copenhagen Obs.*, No. 19), E. Sinding (*ibid.*, No. 146) and E. H. Bilo and I. van Houten-Groeneveld (*B.A.N.*, 15, 155, 1960). Further references to this work will be found in a paper by E. H. Bilo and H. C. van de Hulst in *B.A.N.*, 15, 119, 1960. The future values are taken from the paper by I. V. Galibina in *Bull. Inst. Th. Astr. (Leningrad)*, 6, 668, 1958.

Comet		Original $1/a$	Osculating $1/a$	Future $1/a$
Klinkerfues	1853 III	+ 99	- 803	
Bruhns	1863 I	+ 528	(- 59)	
Baeker-Tempel	1863 VI	+ 12	- 495	
Fabry	1886 I	- 7	- 694	
Barnard	1886 II	+ 316	- 478	
Barnard-Hartwig-Pechüle	1886 IX	+ 63	- 576	
Barnard-Brooks	1889 I	+ 42	- 692	- 597
Brooks	1890 II	+ 72	- 215	
Denning	1892 II	+ 853	- 175	+ 543
Perrine	1897 I	+ 30	- 882	- 371
Coddington-Pauly	1898 VII	- 16	- 607	- 766
Swift	1899 I	- 7	- 1053	- 1280
Brooks	1904 I	+ 216	- 504	+ 523
Kopff	1905 IV	+ 45	- 443	
Brooks	1905 VI	+ 621	- 142	
Giacobini	1907 I	+ 25	- 499	- 277
Morehouse	1908 III	+ 158	- 732	- 422
Neujmin	1914 III	- 66	- 980	- 122
Delavan	1914 V	+ 12	- 146	+ 50
Mellish	1915 II	+ 140	- 234	+ 1007
Metcalf-Borrelly	1919 V	+ 18	- 193	- 52
Baade	1922 II	+ 2	- 383	
Orkisz	1925 HT I	+ 54	- 566	- 536
Shajn-Comas Solá	1925 VII VI	+ 73	- 464	
van Biesbroeck	1925 VII VII	+ 115	- 273	
Beyer	1930 IV	+ 525	- 182	- 45
Geddes	1932 VI	+ 72	- 595	- 217
van Biesbroeck	1936 I	+ 205	- 487	- 286
Whipple	1937 IV	+ 45	- 92	+ 1355
van Gent	1941 VIII	+ 83	- 279	
Whipple-Bernasconi-Kulin	1942 IV	+ 261	- 618	
van Gent	1944 IV	+ 0	- 937	
Jones	1946 VI	+ 45	- 699	

APPENDICES

APPENDIX D

LIST OF COMETS FOR QUICK REFERENCE

In the following table all the individual comets of this catalogue are listed in order of increasing inclination. The table will be found useful for the rapid identification of comets, selection of comet groups, comparison of orbits, etc. For each comet, the angular elements are given in the order i , Ω , ω , followed by q and the reference number of the comet in the main catalogue. For periodic comets, only the last return is tabulated.

i	Ω	ω	q	No.	i	Ω	ω	q	No.
1.6	133.9	224.9	0.674	118	12.6	247.3	223.2	0.861	251
1.9	89.0	7.2	0.862	100	12.7	54.3	176.8	1.328	385
2.2	278.7	91.9	1.028	730	12.8	105.1	186.5	1.250	809
* 3.0	49.4	296.7	1.392	432	12.8	217.0	268.7	0.337	107
3.0	171.1	167.8	1.298	434	12.8	45.9	13.3	1.817	413
3.3	229.6	69.3	1.305	669	13.2	233.1	184.1	0.556	767
3.6	42.1	321.6	1.077	824	13.3	164.4	197.3	1.463	640
3.7	126.0	357.7	2.157	830	13.4	86.5	343.5	1.618	829
3.8	156.2	144.8	2.032	745	13.4	62.8	40.0	1.777	828
4.0	155.1	354.9	3.388	804	13.6	114.6	94.1	0.072	766
4.2	229.6	62.8	0.408	609	13.8	165.6	37.9	1.117	744
4.3	315.2	22.6	0.907	16	13.9	118.2	205.9	2.259	790
4.3	342.9	158.6	3.340	481	14.1	239.5	287.0	1.357	261
4.4	192.6	309.7	0.647	90	14.6	195.1	200.0	1.632	489
4.6	25.4	259.7	1.545	722	15.0	347.2	346.7	1.547	727
4.7	121.0	161.7	1.516	801	15.5	114.4	354.8	1.558	536
4.8	137.6	292.8	1.749	656	15.8	150.5	16.5	1.323	803
5.4	290.9	113.6	1.153	497	15.9	242.6	167.8	1.154	784
5.5	6.1	301.1	1.280	375	16.4	127.8	343.0	1.665	749
5.5	85.1	46.3	1.147	429	16.4	150.3	159.7	0.825	36
5.6	176.9	197.1	1.763	822	16.8	145.9	338.4	1.778	777
5.6	118.3	278.7	1.882	545	17.2	124.6	326.4	1.385	798
6.0	228.3	50.0	0.513	203	17.3	28.4	239.1	2.400	689
6.1	42.5	331.7	1.095	64	17.4	77.1	192.3	1.011	608
6.2	167.4	215.3	2.234	733	17.6	246.1	15.1	1.394	394
6.2	23.1	121.7	0.948	34	17.6	215.4	356.3	0.855	792
6.6	149.0	134.3	2.415	768	17.9	78.6	358.4	1.596	679
6.9	66.8	312.6	0.725	365	18.1	143.6	174.4	1.378	735
6.9	358.9	201.5	1.250	690	18.3	229.4	99.5	0.223	96
7.0	296.2	45.5	1.933	825	18.5	254.2	187.0	1.604	805
7.3	325.2	260.8	0.464	202	18.7	22.5	257.0	1.277	687
7.9	76.1	178.1	0.403	116	19.0	238.3	94.9	0.753	539
8.2	346.2	44.4	2.545	806	19.2	311.2	129.5	0.485	550
8.4	123.6	12.9	2.026	802	19.6	99.9	84.7	1.253	815
8.7	119.2	232.8	1.582	823	19.7	359.0	166.7	1.927	817
9.0	143.6	294.4	0.512	494	19.7	69.7	7.3	1.465	738
9.1	79.2	350.2	0.892	175	19.7	100.1	39.8	1.354	680
9.5	321.6	355.8	5.538	795	20.8	332.4	14.3	2.121	486
9.8	79.7	159.5	1.771	353	21.0	332.9	33.4	0.954	53
9.8	191.4	185.0	0.760	49	21.3	208.1	5.8	0.921	197
9.9	342.9	137.0	0.871	103	21.5	298.1	24.8	0.513	69
10.3	188.5	190.4	2.450	785	21.7	357.6	44.5	1.832	811
10.3	331.3	69.7	1.356	406	21.7	94.4	170.2	1.161	746
10.6	206.3	200.6	1.652	779	22.1	108.2	340.9	1.149	555
10.6	328.0	193.7	1.338	588	22.3	66.5	97.4	1.116	556
11.3	30.3	76.2	0.902	120	22.5	96.6	4.6	2.285	454
11.3	135.4	44.4	1.741	820	23.1	210.3	107.3	0.135	725
11.4	194.2	140.5	1.455	441	23.2	203.2	317.0	0.208	718
11.6	97.1	147.4	1.953	641	23.4	262.3	264.5	0.924	563
11.7	67.3	209.1	1.183	648	23.9	199.4	72.3	1.198	527
12.0	86.2	52.0	1.196	819	24.5	77.9	327.3	1.131	625
12.4	334.7	185.2	0.339	826	24.8	265.3	252.7	0.976	424
12.5	119.3	191.0	1.369	793	25.7	183.8	120.6	1.686	542
12.5	2.3	349.1	2.324	787	25.9	45.7	13.8	0.853	191

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<i>i</i>	Ω	ω	<i>q</i>	No.	<i>i</i>	Ω	ω	<i>q</i>	No.
26-3	329-1	132-7	0-942	664	49-7	6-1	94-0	0-831	231
26-3	57-0	32-2	0-621	643	49-9	295-9	199-6	0-368	663
27-0	6-3	259-3	1-633	572	50-1	303-8	13-2	1-429	781
27-3	203-9	161-1	2-507	808	50-9	196-7	325-0	0-410	134
28-3	305-2	278-3	0-327	58	51-5	220-9	118-3	2-259	562
28-8	137-5	30-8	0-928	29	51-5	4-2	70-0	1-494	144
28-9	35-6	162-4	0-420	455	51-6	295-2	129-8	0-738	52
28-9	250-4	196-0	0-743	791	52-1	306-2	5-0	0-843	499
29-4	102-3	14-9	0-590	351	52-7	158-7	124-3	1-616	215
30-7	261-9	339-6	1-529	229	53-1	121-5	72-3	0-618	208
30-9	196-0	172-8	0-936	814	53-2	2-3	194-4	0-970	774
30-9	3-0	133-7	0-411	470	53-2	139-7	191-8	4-709	717
31-1	76-2	350-8	1-452	821	53-5	78-2	118-8	0-443	535
31-2	271-8	60-1	1-102	403	54-6	281-0	85-2	1-050	183
31-3	94-9	314-5	1-582	163	54-7	269-8	207-0	1-022	658
31-3	207-3	169-9	1-434	423	54-8	72-8	247-8	1-005	533
32-2	46-1	312-0	0-683	285	55	125	91	0-38	44
32-4	180-7	100-9	0-491	59	55-1	134-3	235-3	1-086	662
32-4	27-4	62-2	0-713	124	55-3	16-6	59-4	0-427	91
32-4	274-9	183-7	1-629	560	55-6	179-0	1-7	0-566	439
32-6	93-1	24-5	0-519	57	56-3	138-4	290-8	1-528	400
32-7	88-0	121-3	0-190	540	56-4	85-4	8-6	1-213	490
32-8	202-1	180-9	0-747	269	56-4	348-6	205-5	1-255	221
33-0	85-9	33-4	0-443	73	56-5	178-8	331-9	1-071	154
33-2	232-9	13-3	4-446	797	56-7	9-3	199-9	0-270	407
33-8	293-5	153-0	0-489	512	57-0	237-6	320-4	1-136	701
34-1	216-9	149-6	1-688	337	57-0	312-3	21-9	1-094	153
35-0	357-7	81-9	0-336	84	58-0	250-5	133-6	1-481	211
37-2	80-3	287-4	0-390	70	58-1	18-1	110-3	2-331	615
38-0	171-6	335-2	1-287	672	58-9	31-4	269-5	0-045	334
38-2	225-1	87-3	0-985	247	59-1	205-7	42-9	0-749	379
38-7	241-7	24-5	1-027	419	59-1	220-7	191-6	1-665	758
39-3	353-2	303-8	0-560	705	60-7	275-9	350-6	0-006	80
40-0	199-2	279-4	2-007	189	60-7	250-3	11-7	0-660	360
40-1	207-4	243-2	0-566	244	61-2	123-5	314-1	1-127	122
40-2	158-1	358-2	1-115	480	61-3	323-1	100-7	1-628	807
40-7	177-6	329-1	0-123	117	61-5	141-9	170-4	0-307	255
40-9	347-3	57-1	1-254	525	61-8	135-0	129-9	0-835	97
40-9	325-8	129-9	0-799	260	62-5	328-7	12-4	1-015	463
41-6	127-9	107-7	1-734	645	62-9	310-8	114-9	0-970	161
41-8	252-6	92-6	0-983	338	63-2	268-8	4-1	0-646	158
42-3	246-3	359-9	0-699	396	63-2	283-1	78-1	0-064	85
42-3	191-5	320-1	1-047	613	63-3	15-1	85-7	0-764	409
42-4	263-1	35-6	1-080	381	63-4	271-9	354-2	0-735	363
43-1	325-1	304-3	0-049	168	63-5	288-9	169-0	0-716	649
43-7	92-7	199-2	0-216	484	64-2	355-3	29-3	0-748	654
43-8	124-2	343-0	0-485	148	64-5	305-9	115-7	0-771	297
43-9	118-1	5-8	2-774	471	64-6	24-3	89-4	0-602	62
44	213	82	0-371	10	65	320	277	0-622	23
44-6	85-4	64-6	1-179	789	65-4	271-9	330-3	0-958	83
45-1	58-0	354-6	1-459	129	65-4	91-8	18-4	0-811	633
45-6	187-9	96-6	1-202	756	66-0	287-0	345-9	1-040	404
45-6	119-8	177-7	0-252	219	66-1	299-9	44-9	4-043	637
46-4	147-3	15-5	0-963	17	66-3	119-8	152-4	0-676	336
46-4	121-4	185-7	1-115	552	66-5	213-8	184-9	0-499	472
46-9	338-2	114-6	0-905	220	66-5	52-9	228-4	0-451	467
47-1	48-6	151-5	0-222	102	66-9	31-9	236-6	0-894	242
47-5	112-5	338-0	1-482	224	67-1	35-9	245-7	0-625	106
48-2	10-1	41-2	1-307	283	67-1	90-5	47-0	0-482	605
48-3	159-2	124-7	1-150	810	67-2	204-0	33-2	1-159	241
48-7	23-1	254-4	0-043	232	68-0	59-7	97-5	1-104	530
48-9	204-4	118-5	0-771	302	68-2	94-3	180-5	1-081	243
49-3	334-9	106-4	1-566	576	68-3	233-5	36-8	0-215	108
49-5	325-5	216-7	0-194	694	69-5	83-1	273-2	1-171	813

APPENDICES

i	Ω	ω	q	No.	i	Ω	ω	q	No.
69-6	32-8	65-9	1-357	446	86-7	311-8	136-0	1-001	626
69-9	74-7	233-3	1-702	453	87-0	207-2	324-2	0-983	430
70	166	215-145	0-79	5	87-6	280-4	222-5	0-654	321
70-0	259-8	205-6	0-626	452	87-6	66-9	274-3	1-274	724
70-1	18-3	194-1	1-101	544	87-7	215-0	11-1	3-684	591
70-2	266-5	205-6	1-143	131	87-7	193-5	201-3	0-270	386
71-0	270-8	14-0	3-747	528	87-9	310-5	68-7	0-720	742
71-7	344-8	38-5	1-037	620	87-9	169-2	12-1	0-089	66
72-0	116-7	24-6	2-079	606	87-9	314-5	121-6	0-772	266
72-3	114-4	271-5	1-756	566	88-4	151-7	41-1	1-143	440
72-5	359-0	88-6	0-498	113	88-6	74-9	254-7	0-746	776
72-5	263-2	47-3	1-095	447	88-6	56-2	27-2	0-859	92
72-8	129-0	54-3	1-724	696	89-7	194-7	177-3	0-883	185
73-4	219-4	124-9	0-738	30	89-7	254-2	129-3	1-971	420
73-8	205-9	209-0	0-061	369	89-8	72-3	112-4	1-198	170
74-0	45-7	294-4	0-142	248	90-6	236-9	279-6	0-027	192
74-2	255-2	199-0	0-774	771	92-4	19-1	231-8	1-036	589
74-2	102-4	59-2	0-902	398	92-5	254-1	111-7	0-026	304
74-3	212-8	303-5	1-254	616	92-6	67-0	127-2	0-427	132
75-3	134-4	331-4	0-668	35	92-9	246-9	66-9	2-107	719
76-2	83-8	298-8	0-843	435	92-9	196-4	126-8	0-945	657
76-9	272-9	10-8	1-786	461	93-6	285-3	59-1	0-042	86
77-1	313-7	10-4	4-051	95	93-8	275-2	85-7	1-022	760
77-1	88-2	115-4	0-990	355	93-9	67-6	40-3	0-355	796
77-2	347-1	116-8	1-009	344	94-5	256-9	85-3	0-875	670
77-5	198-6	61-9	1-499	716	94-5	235-7	17-4	0-840	105
77-8	0-9	270-4	0-713	529	95-0	202-8	337-0	2-226	688
77-9	127-4	173-8	0-591	362	95-5	358-6	282-0	0-201	281
78-0	218-8	269-6	0-971	417	95-6	9-4	81-7	0-537	25
78-1	279-1	110-9	0-760	372	95-6	213-0	261-0	0-320	238
78-1	98-7	357-2	0-707	296	96-0	231-7	193-8	0-794	330
78-2	103-3	177-6	1-392	348	96-1	250-1	254-3	0-956	371
78-4	245-4	69-8	1-647	622	96-5	89-2	71-7	0-303	511
78-5	134-2	148-5	1-100	638	96-6	66-1	148-6	0-330	310
79-1	142-3	273-9	0-801	110	96-6	339-7	91-5	1-766	234
79-3	85-9	76-9	0-293	284	96-7	177-1	87-8	0-560	82
79-4	340-2	223-4	1-445	674	97-1	278-6	321-0	1-153	607
79-5	92-3	300-2	0-847	72	97-2	342-9	253-8	0-778	759
79-6	72-2	57-3	4-074	786	97-3	311-1	9-4	2-828	707
79-7	325-3	209-8	1-199	282	97-5	316-8	101-6	0-277	258
79-8	31-2	213-4	0-921	286	98-3	148-2	242-9	0-691	324
79-8	297-5	25-6	0-716	517	98-9	101-0	163-0	1-260	412
79-9	187-6	138-0	0-749	210	99-0	44-6	205-0	1-216	166
80-4	303-4	279-3	0-407	520	99-2	283-0	16-3	0-508	339
80-7	93-2	178-5	2-508	378	99-4	14-1	355-0	1-817	318
80-8	275-5	13-4	0-342	173	99-6	219-1	40-7	1-882	476
81-7	85-4	156-2	0-776	127	99-9	147-8	325-1	1-087	603
82-6	37-3	126-6	0-642	382	100-0	326-3	98-9	0-544	276
83-0	302-0	109-5	0-695	77	100-0	318-4	36-2	1-110	570
83-3	106-2	78-1	1-313	298	100-2	288-8	38-7	0-843	384
83-3	183-2	136-7	1-433	123	100-4	264-6	144-7	3-870	783
83-5	72-7	276-5	0-723	485	100-4	175-4	32-3	2-115	233
83-6	109-0	224-8	0-755	587	100-9	150-1	230-3	2-199	104
84-4	69-2	119-6	0-479	383	100-9	240-6	99-2	0-281	78
85-0	294-2	127-3	0-330	473	101-6	138-3	86-3	0-663	390
85-0	216-6	208-0	0-960	240	102-2	252-0	143-2	1-576	347
85-1	77-5	47-2	0-176	596	102-4	186-3	151-0	0-506	193
85-1	79-0	12-9	0-664	227	103-0	328-9	136-5	0-626	151
85-4	118-1	74-5	0-795	293	103	224	95	0-470	538
85-4	280-2	330-1	0-822	287	103-8	304-8	28-5	0-227	181
85-5	251-4	55-6	0-629	295	103-9	232-0	156-1	0-106	75
85-6	259-1	31-9	1-481	389	104-0	103-6	189-4	0-493	45
85-7	351-2	115-5	1-009	112	104-3	280-8	159-4	1-630	392
86-5	48-2	32-5	0-534	780	104-9	30-5	255-7	0-177	61

COMET CATALOGUE

<i>i</i>	Ω	ω	<i>q</i>	No.	<i>i</i>	Ω	ω	<i>q</i>	No.
105°	316°	20°	1.40	54	124.5°	179.3°	157.5°	0.672	604
105.8	309.0	89.5	2.059	731	124.6	144.3	99.7	1.107	518
106.3	312.0	221.2	0.753	711	125.0	215.4	329.7	2.314	621
106.3	212.5	114.2	0.735	31	125.1	276.4	53.5	2.708	475
106.4	209.3	240.5	0.504	213	125.4	236.1	334.1	0.592	182
106.5	50.5	169.2	0.092	176	125.5	306.6	46.8	4.274	816
106.9	142.4	65.4	1.035	162	125.6	126.1	237.1	0.096	125
107.0	46.8	3.7	0.897	352	125.9	151.4	258.7	0.138	195
107.5	338.7	348.2	0.885	782	126.4	179.2	344.7	0.504	177
107.8	33.4	84.3	0.991	354	126.4	287.0	89.9	1.296	483
107.9	225.1	300.6	0.166	812	127.1	122.7	104.9	0.555	114
107.9	144.4	255.2	0.515	126	127.3	94.5	181.1	1.145	180
108.1	35.7	122.0	0.788	513	127.8	276.3	166.6	0.774	43
108.1	192.3	276.6	0.329	237	128.1	335.3	59.4	0.567	67
108.2	34.9	348.6	2.407	702	128.4	136.4	328.4	1.347	581
108.7	349.0	74.6	0.648	259	128.5	325.5	58.3	0.010	391
109.4	325.2	109.5	0.749	88	128.6	191.0	323.1	2.194	262
109.7	33.0	232.5	0.931	301	128.9	59.2	336.1	0.708	130
109.8	189.8	328.4	0.923	492	129.1	101.6	95.8	0.840	150
110.0	213.0	96.3	1.083	322	129.2	322.4	182.1	0.962	704
110.9	340.5	119.6	0.281	60	129.3	331.4	279.8	0.527	147
111.0	116.2	103.9	0.318	37	129.8	175.7	347.5	0.812	428
111.4	232.4	357.4	1.403	706	130.0	17.4	331.4	0.999	94
111.7	312.6	188.2	1.231	315	130.3	119.9	229.9	2.518	728
112.0	121.7	144.9	1.283	755	131.0	285.4	147.2	0.966	142
112.6	252.5	4.0	1.068	294	131.1	110.3	203.0	0.245	465
112.8	275.1	6.3	0.449	366	131.1	339.3	75.8	0.401	222
113.0	33.2	116.4	0.543	526	131.1	318.6	37.2	0.905	250
113.6	138.7	152.8	0.963	291	131.4	221.6	40.1	2.553	734
113.8	227.0	255.3	0.778	565	131.4	33.1	211.3	0.855	218
113.9	228.4	170.9	2.045	257	131.6	53.4	126.6	0.579	312
114.7	265.2	137.6	0.309	373	131.7	109.2	99.1	0.349	135
115.2	19.2	184.3	1.580	146	132.1	268.7	64.5	1.008	557
115.7	185.3	103.2	1.070	346	133.1	127.4	329.8	1.064	661
116.1	35.4	119.5	0.798	140	134.3	324.9	253.7	0.390	159
116.2	122.2	357.2	0.677	772	134.4	8.9	119.0	0.523	101
116.9	91.8	348.1	0.855	171	134.9	139.1	242.3	0.386	55
117.0	166.6	129.1	0.578	278	135.0	176.2	346.1	0.626	299
118.5	232.3	331.9	0.169	63	135.3	339.5	26.9	0.126	198
119.0	221.4	277.8	0.173	256	136.1	58.0	33.4	0.872	685
119.6	55.2	294.4	0.983	495	136.4	319.4	19.3	0.807	194
119.6	110.7	239.8	0.403	143	136.6	292.0	1.4	2.061	765
119.9	215.2	308.8	0.316	794	136.7	74.1	204.6	1.183	200
120.1	80.4	66.6	0.406	567	137.0	321.7	50.9	0.006	695
120.4	105.4	86.9	0.603	21	137.5	357.0	230.6	0.803	292
120.5	194.8	178.8	0.398	414	137.6	251.6	215.0	0.780	149
120.6	321.2	68.9	1.908	408	138.0	146.3	331.6	0.839	288
120.8	238.4	156.6	1.221	209	138.1	311.6	89.2	0.528	651
120.8	178.8	79.5	0.832	15	138.4	302.1	165.0	0.593	89
121.0	25.0	134.1	0.368	268	138.5	336.6	196.2	0.110	713
121.1	290.1	51.0	1.948	505	138.8	89.3	320.9	0.129	503
121.1	317.6	63.1	0.950	343	139.2	246.7	100.9	0.505	115
121.5	177.8	233.8	0.385	331	139.5	101.7	90.8	0.828	39
121.8	142.9	198.2	1.009	317	139.8	136.3	36.5	1.007	393
121.9	264.3	45.9	0.518	639	140.2	103.8	171.6	0.945	498
122.2	42.3	199.2	0.909	254	140.2	193.0	154.3	1.293	141
122.4	162.8	78.8	1.376	228	140.2	98.0	122.1	0.634	364
123.0	282.8	354.8	0.323	583	140.3	97.0	123.6	0.756	456
123.1	258.2	145.2	1.814	357	140.6	270.7	350.2	0.748	715
123.2	316.0	276.6	0.298	553	140.6	223.6	132.7	1.052	482
123.3	21.9	107.2	0.889	184	140.7	26.2	131.6	0.608	160
123.9	320.7	73.9	4.501	769	141.6	321.3	272.7	0.192	436
124.0	16.3	124.8	0.563	270	141.7	97.8	317.1	2.052	491
124.3	210.3	104.8	0.674	98	141.9	46.3	323.1	0.355	358

APPENDICES

i	Ω	ω	q	No.
141-9	73-5	124-3	3-486	631
142-0	77-9	69-8	0-830	50
142-0	347-0	69-6	0-008	370
142-2	140-6	95-1	1-009	271
143-4	157-9	117-7	1-356	523
143-7	99-5	237-8	0-847	179
143-9	186-4	85-2	1-195	425
144-2	38-2	192-5	2-572	741
144-3	2-8	82-6	0-006	214
144-4	2-5	109-8	0-067	76
144-6	141-1	126-1	0-764	580
144-7	7-1	86-2	0-005	356
144-8	182-4	118-0	1-923	368
145-0	324-4	225-3	1-082	157
146-1	147-2	172-3	1-063	444
146-3	25-7	8-7	0-327	457
146-4	58-7	114-8	0-863	646
146-4	217-5	256-9	1-241	187
146-5	41-1	24-4	1-332	462
146-7	357-8	205-8	4-181	575
147-3	95-9	90-6	0-389	320
147-4	78-2	55-5	1-485	235
147-5	226-0	81-0	0-842	788
148	245	10	0-470	40
148-4	275-2	331-7	0-886	335
148-4	158-0	110-3	0-684	509
148-4	48-1	63-4	0-064	326
148-6	111-2	260-4	0-528	119
148-8	131-2	6-3	1-025	93
150-2	175-1	114-4	0-747	138
150-5	170-6	307-7	0-568	65
150-7	263-3	99-7	0-634	230
150-9	176-6	136-3	1-064	827
152-4	315-6	53-0	1-457	521
152-5	76-2	269-6	0-740	751
152-8	79-8	61-4	0-961	128
152-9	188-3	347-2	0-807	342

i	Ω	ω	q	No.
154-3	86-2	331-3	2-047	410
155-1	121-4	73-5	3-267	709
155-7	268-1	356-7	0-327	46
155-7	209-6	358-4	0-587	437
156-4	50-0	153-0	0-401	469
156-5	254-3	280-1	0-998	691
156-7	210-2	277-6	0-539	800
156-9	261-5	22-5	0-568	263
158-7	85-3	310-7	1-026	74
158-7	161-0	155-5	1-427	279
158-7	10-1	119-2	0-764	541
158-9	242-5	170-6	0-699	165
159-3	44-6	219-8	0-256	152
159-6	252-0	306-7	0-504	818
159-8	70-9	275-9	1-092	253
160-0	338-1	47-1	0-675	426
160	221	350	1-010	3
161-3	82-7	36-4	0-758	681
162-2	57-8	111-7	0-587	504
162-6	51-5	93-4	0-583	27
162-7	232-6	170-9	0-977	306
162-9	342-1	178-5	1-115	303
163-8	311-5	236-1	2-256	402
166-4	358-3	340-5	1-815	401
166-9	279-0	22-4	1-501	451
167-5	159-2	57-8	1-063	136
168-2	42-4	268-7	0-790	666
169-1	69-6	151-3	0-729	87
169-3	101-5	168-1	0-075	614
169-6	301-3	22-3	1-018	697
169-8	52-9	325-6	1-231	265
170-9	292-2	245-8	0-486	51
170-9	60-0	210-5	2-040	204
172-1	327-8	27-2	0-981	290
172-5	280-4	163-7	4-113	678
175-1	82-8	301-5	0-966	111
178-1	96-8	151-4	0-909	300

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